PROCEEDINGS OF INTERNATIONAL SCIENTIFIC CONFERENCE

DIGITAL COMPETENCIES IN HIGHER EDUCATION

September 18, 2025
LOGOS University College, Tirana, Albania

Co-funded by the European Union

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TRENDS, CHALLENGES AND PERSPECTIVES

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LOGOS UNIVERSITY COLLEGE
September, 2025

EDITORS

Valbona NATHANAILI
Logos University College

Elona KARAFILI
Polis University

Blerta DRENOFCI (CANI)
Logos University College

Konstantinos GIAKOUMIS
Logos University College

Dušanka BOŠKOVIĆ
University of Sarajevo

Arbana KADRIU
South East European University

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Address: Rr: "Dritan Hoxha", Tiranë.
valbona.nathanaili@kulogos.edu.al
www.kulogos.edu.al

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VALBONA NATHANAILI

LOGOS University College

Dr. Nathanaili is currently a lecturer and researcher in the Department of Pedagogy and Psychology, LOGOS University College, Tirana, Albania, with an experience of more than 35 years in the field of academia and publication. She is a Bachelor in physics and a doctoral degree holders in the science of pedagogy, both from University of Tirana. Major areas of research over the last few years are the politics and reforms in Albanian Education System, methodology of teaching science, university pedagogy, the future of schooling and Recognition and Accreditation of Prior Learning gained after flexible learning paths. She is analyst, writers and contributor for different periodic Albanian newspaper and television outlets. Nathanaili, in collaboration with different HEIs, has been initiator and supporter of STEM national campaigns, to encourage girls to pursue careers in science, technology, engineering and math fields and promote women in those fields. Dr. Nathanaili has extensive experience in designing and directing research and capacity building projects.

KONSTANTINOS GIAKOUMIS

LOGOS University College

Konstantinos Giakoumis is Professor of History, Arts and Didactics at LOGOS University College, where he also leads the Faculty of Humanities and Linguistic Communication. He is a doctoral degree (Ph.D.) holder PhD from the University of Birmingham, serves on the international advisory board of Art Readings (Institute of Art Studies, Bulgarian Academy of Sciences) and reviews for the Serbian Academy of Sciences, the University of Crete, and international journals including Speculum (University of Chicago Press), the Journal of Religious History (Wiley), and Politics, Religion & Ideology (Taylor & Francis). He has also served as coordinator of a number of ERASMUS+ CBHE projects (Roaming, Homo Digitalis, DiLanEdu-WB). For a Marie Curie fellowship application in 2018 he received the European Commission's Seal of Excellence. A prolific scholar, his work appears in leading journals such as Byzantine and Modern Greek Studies (Cambridge), Turkish Historical Review (Brill), and the International Journal of Cultural Policy (Taylor & Francis). His most recent book examines the Codex of the Diocese/Metropolis of Dryinoupolis and Gjirokastra (1760–1858), published by LOGOS University College Press.

ELONA KARAFILI

POLIS University

Dr. Elona Karafili is an expert in the field of economic development. She is a lecturer and researcher at POLIS University, Tirana, Albania since 2007. She holds a PhD in Urban Planning from Ferrara University and Polis University. Elona currently holds the position of the Deputy Rector of POLIS University. Her main topics of interest and expertise

include regional economic development and territorial competitiveness, which she has explored through a number of projects that focus on place-based innovation. Dr. Karafili has extensive experience in designing and directing research and capacity building projects. She is enthusiastic to strengthen the innovation ecosystem in Albania through fostering co-creative processes, academia–business collaboration and knowledge transfer, startup support and commercialization of research.

DUŠANKA BOŠKOVIĆ

University of Sarajevo

Vice Rector for Quality at the University of Sarajevo and a Professor at the Faculty of Electrical Engineering. Her research interests and teaching are focused on software engineering in biomedical and cognitive domains. She is highly motivated to learn about problem domains and committed to achieving a high level of user experience. In addition to teaching and research, she is engaged in various activities aimed at improving education in Bosnia and Herzegovina, especially through promoting student-centered and outcome-based learning and using software as educational content.

BLERTA DRENOFCI (CANI)

LOGOS University College

Dr. Drenofci has devoted her efforts for last 20 years at the Albanian Disability Rights Foundation, to the activities in advocacy and lobbying for disability related policy and legislation adoption and implementation and offering of supportive services for people in need throughout the country. She is an expert in the area of social policies and collaborator in the formulation of policy framework for people with disabilities in Albania. She has directed ADRF contribution in several important legal initiatives. ADRF is acknowledged as the pioneer and leader of human rights-based approach to disability and it is one in the few organizations that offer models of supportive services like mobility means, supported employment, free legal aid for people in need in Albania. Blerta has an PhD in Social Sciences and has an academic background, being a teacher of University of Tirana since 2013. She has been the leader and the author of a lot of studies in the field of social policies in and outside the country. She has been involved as a consultant in the research and policy development by several international agencies. During the years 2014-2022, she has been involved in the development of the new reform for the assessment of disability in Albania, based on international standards.

ARBANA KADRIU

South East European University

Arbana Kadriu is a Full Professor of Computer Science at the Faculty of Contemporary Sciences and Technologies, South East European University (SEEU) in Tetovo, North Macedonia. She earned her PhD in Computer Science from Ss. Cyril and Methodius

University, Skopje (2008), specializing in natural language processing and information retrieval. Her research spans AI and machine learning, software engineering, web information retrieval, social network analysis, and e-learning, with a growing focus on speech technologies for low-resource languages. Prof. Kadriu teaches across undergraduate, master's, and doctoral programs, organized into three clusters: Data & Intelligence, Software & the Web, and Research & Methods. She has supervised numerous master's and PhD theses in areas such as data mining–driven decision support, Albanian speech recognition, authorship analysis, and automatic music generation. Prof. Kadriu has authored 70+ publications across journals and international conferences (IEEE, Springer, PLOS ONE, and others) and contributes to international projects, including Erasmus+ initiatives on digital humanities and quality assurance, as well as COST actions on language technology and language learning.

FOSTERING INNOVATION AND ADVANCING DIGITAL COMPETENCIES IN HIGHER EDUCATION

Prof. Ilia **NINKA**

Rector, LOGOS University College, Tirana, Albania

Good morning, everyone. And thank you for being here today.
Honorable Mrs. Gertiola Çepani, Director of Labour Market Services at the National Employment and Skills Agency.
Honorable Prof. Konstantinos Giakoumis, Dean of the Faculty of Humanities and Linguistic Communication at LOGOS University College, and Coordinator of the HOMO DIGITALIS Project.
Honorable Dr. Valbona Nathanaili, Conference Coordinator.
Distinguished guests, dear colleagues, and participants,
It is truly a privilege to welcome you to this international conference, organized by LOGOS University College in collaboration with our valued partners: The University of Patras, Polis University, the Public International Business College Mitrovica, Kolegji AAB in Prishtina, the University of Sarajevo, the Sarajevo School of Science and Technology, the South East European University in Tetovo, and Otto-von-Guericke University in Magdeburg, Germany.

Our conference, "Digital Competencies in Higher Education: Trends, Challenges, and Perspectives", is built around three main tracks:

- Digital competencies in higher education and the labour market;
- Institutional strategy and policy development;
- The intended and attained curriculum.

We gather here today under the strong motto: "Digital transformation is no longer a future aspiration – it is a current imperative." Fostering innovation and advancing digital competencies in higher education requires clear strategies, strong partnerships, and a commitment to aligning curricula with the needs of society and the labour market. It is a call for systemic change and forward-looking policies. Fostering innovation and advancing digital competencies in higher education it is part of our mission.

We are honoured to be joined today by such distinguished experts and practitioners. This conference is not only an opportunity to present research, but also a space to engage in dialogue, to share experiences, and to learn from one another. Together, let us use this occasion to exchange ideas and to build the pathways toward meaningful transformation in higher education.

Thank you.

DIGITALIZATION AND ITS IMPORTANCE IN THE LABOR MARKET

Mrs. Gertiola **CEPANI**

General Director of Labour Market Services,
National Agency for Employment and Skills, Albania

Digitalization is one of the most important directions of development in Albania, directly affecting the labor market and the way citizens receive services. It does not represent only a technological process, but a comprehensive transformation that impacts the relationships between institutions, citizens, and employers.

In the field of employment, digitalization has become a key instrument for increasing efficiency and facilitating access to the labour market of all Albanian citizens. Through the online Employment Services System and the portal puna.gov.al, jobseekers can register online, apply for support programs, follow the process in real time, and benefit from personalized services. On the other hand, employers are provided with a simplified environment for posting vacancies and selecting candidates, thus helping to create a more balanced and transparent labor market.

Another important element is the simplification of registration processes, whether in VET schools, vocational training centers, or employment offices. With electronic identification and online applications, citizens avoid bureaucracies while institutions build integrated data systems that serve more effective policies.

Digitalization also has a direct impact on education. The integration of technology into general and vocational education, the introduction of subjects focused on information technology, and the use of online learning platforms prepare younger generations with the essential skills required for the digital economy. These elements compose the foundation for increasing employability and for preparing the workforce to face the challenges of the modern labor market.

Supportive policies and programs, such as the Youth Guarantee, Employment Promotion or Self-employment Programs, are important tools for empowering young people and creating spaces for innovation. Through them, every young person can find a job offer, training, or internship, as well as may develop business ideas that may receive financial support.

In this sense, digitalization is no longer an option, but a necessity for modernizing Albania, increasing competitiveness, and aligning with European standards. It represents the future of work and an opportunity for everyone to be included in a more dynamic, inclusive, and innovative labor market.

ADDRESSING THE DIGITAL LEAP IN THE WESTERN BALKANS

Preliminary impact exposition of the HOMO DIGITALIS Erasmus+ CBHE Project

Prof. Konstantinos **GIAKOUMIS**

LOGOS University College
Project Coordinator

The 'digital leap' is a sustainable formative factor in many areas of science and society. Its advances encompass a wide range of disciplines, including humanities, education and the cultural sector. As an inter-disciplinary field of study, digital humanities are a bridge linking the aforementioned disciplines with information technology for the purpose of helping others experience and explore these areas in new and stimulating ways, as well as scientists within the same disciplines advancing their research using technological tools. Digital humanities and educational media further stretch beyond academia, mainly through collaboration with the cultural heritage, tourism and education sectors. Last but not least, digital humanities have proved to be a major step towards the Europeanization of heritage. Although the necessity to integrate digital tools in humanities and education has been felt in the Western Balkans as elsewhere, there is scarcity of operators providing the expert knowledge, skills and competences necessary to develop properly trained professionals to engage technology for the purpose of devising creative solutions in a range of humanities and education application areas at cultural heritage institutions, schools, public agencies, international organisations and private companies.

To address this need, there is a need for a shift in the pedagogical paradigm. Shrinking intake of freshman students in Humanities and Education study programmes in the West Balkans on account of low expectations of return on investment, fierce competition over people's free time from diverse experiences-offering industries, as well as the fourth industrial revolution rapidly transforming the way in which Generations Z and Gen Alpha learn require profound changes to traditional study programmes in these disciplines and synergies with other fields, most notably digital humanities and educational media, to make them enticing once again. As an inter-disciplinary field of study, digital humanities are a bridge linking humanities, education and the cultural sector with information technology for the purpose of helping others experience and explore these areas in new and stimulating ways. At the same time, digital humanities and educational media provide new, alternative and innovative ways in which scientists within the same disciplines advance their research using technological tools. Digital humanities and educational media further stretch beyond academia, mainly through collaboration with the cultural heritage, tourism and education sectors. Last but not least, digital humanities have proved to be a major step towards the

Europeanization of heritage. It is precisely this gap between the demand of specialists in humanities and education and the supply of relevant academic offers in HEIs in the West Balkans that sets the background of the Homo Digitalis project.

The volume at hand outlines some of the ways in which partner HEIs reflected on their project activities and their significance in Higher Education. The papers collected in this volume are thus distillations of the ways in which digital technologies were applied in rethinking curricula, fostering innovative teaching and learning practices, and reinforcing the employability of graduates. They illustrate how digital tools can be effectively integrated into humanities and education study programmes, while also highlighting the opportunities and challenges that arise in aligning academic offers with fast-changing societal and market needs. The contributions range from curriculum redesign and staff training to innovative applications of AI in education, digital storytelling, and architectural heritage conservation. They reveal both, the potential and the complexity of embedding digital competencies into higher education: while students increasingly embrace tools such as generative AI, collaborative platforms, and virtual heritage applications, institutions must still address preparedness asymmetries, infrastructural gaps, and ethical challenges. In this sense I would further argue that, while papers emphasize inclusivity and professional digital competence, an important impact trait of the Homo Digitalis project was not only pedagogical innovation, but its contribution to raising HE awareness of its cultural and social responsibility towards the use of digital technologies. Altogether, the case-studies in this volume trace a roadmap for higher education in the Western Balkans that amalgamates tradition and innovation, strives to pursue equitable access to digital opportunities, and positions regional universities as active contributors to Europe's wider digital transformation.

THE STRATEGIC ACTIONS FOR AI IN HIGHER EDUCATION

Emeritus Professor, Nikolaos **AVOURIS**

University of Patras, Patras, Greece

The rise of Artificial Intelligence in education has given us both enormous opportunities and significant challenges. Around the world, many proposals have been made on how best to respond. At the policy level, there is already a wealth of analysis. The review of Dell'Erba *et al.* (2025) concerns the policy documents of top-ranked universities, focusing on the innovation-regulation tension, while Jin *et al.* (2025) analyse adoption of GenAI policies in 40 universities across six global regions focusing on the characteristics of the institutions, like compatibility, trialability, observability, and the communication roles/responsibilities, using innovation diffusion theoretical framework. Finally studies in specific countries reveal the characteristics of their educational systems. Abir & Zhou (2025) who studied Japanese universities, found out their cautious stance toward GenAI, emphasizing concerns about academic integrity, transparency, and unintended misuse, while Li *et al.* (2025) performed a cross-national comparative study involving over 100 policy documents across the US, Japan and China. Using these findings, they developed the UPDF-GAI model for guiding universities in developing AI policies. It is interesting to observe that from this study, the different orientation of different academic systems emerged, with the US leaning toward faculty autonomy, Japan emphasizing government-regulated frameworks, and China generally aligned with a centralized, top-down model, prioritizing AI integration and technology-driven implementation over early-stage policy structuring.

Based on these ideas, we provide here a set of key strategic actions, defining the *Action Dimension* of our framework.

- *Action 1*: *Revise Curriculum*. We need to make drastic changes to the curricula content, in order to teach learners how to critically analyse information and verify their sources and develop digital literacy skills that can help them better understand how AI technologies work and how to use them responsibly, this needs to be adapted to the requirements of each subject matter.
- *Action 2*: *Reform Pedagogy*. The way we teach should be adapted in the times of AI. Emphasis should be given on assignments and assessments conducted in class, so that the use of AI for solving problems and completing assignments can be monitored and the unfair use of AI can be avoided.
- *Action 3*: *Training of Educators*. We need to design training programs for educators

so that they can better understand AI technologies and effectively integrate their capabilities into the educational process.

- *Action 4*: *Support Local Content*. We need to ensure that the AI models used in education can be properly trained in the local language and with local data, by providing high-quality, machine-readable local content. An interesting relevant observation is that the corpora used for training AI models, have often bias in certain languages and cultures. For instance, the OSCAR23[1] corpus, a large-scale, multilingual text dataset, with around 1 trillion words, derived from the Common Crawl web archive, used for training many AI models, contains 48% of content in English, and just 0.71% in Greek, or 0.04% in Albanian, while some minority languages are not existent.
- *Action 5: Establish Policy and Governance*. Educational institutions must establish clear regulations regarding the use of AI technologies, defining what is permitted and what is not, as well as the consequences of related violations of academic integrity.

These five actions are not isolated. They cannot be carried out by one group alone. They require collaboration - between educators, students, administrators, policymakers, and technology providers. In short, they require the participation of the entire higher education ecosystem. The road ahead is not simple. But with vision, with cooperation, and with determination, we can ensure that AI serves not just technology, but learning. Not just efficiency, but wisdom.

[1] https://oscar-project.github.io/documentation/versions/oscar-2301/

PROCEEDINGS OF INTERNATIONAL SCIENTIFIC CONFERENCE

DIGITAL COMPETENCIES IN HIGHER EDUCATION

TRENDS, CHALLENGES AND PERSPECTIVES

SEPTEMBER 18, 2025

Hosted by LOGOS University College

in collaboration with:

- University of Patras
- Polis University
- Public International Business College Mitrovica (IBCM)
- AAB College
- University of Sarajevo
- Sarajevo School of Science and Technology
- South East European University
- Otto-Von-Guericke-Universitaet

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CONFERENCE COORDINATOR

Dr. Valbona NATHANAILI
LOGOS University College

SUMMARY OF ACTIVITES

INTERNATIONAL SCIENTIFIC CONFERENCE
DIGITAL COMPETENCIES IN HIGHER EDUCATION
Trends, Challenges and Perspectives

Logos University College, Tirana, Albania
Thursday, September 18, 2025

9.00-9.30	Registration		
9.30-10.00	Open remarks		
	Ilia Ninka, rector, LOGOS Universty College		
	Gertiola Cepani, Director of Labour Market Services at 'National Employment and Skills Agency'		
	Konstantinos Giakoumis, HOMO DIGITALIS Project Coordinator		
	TOPIC	**AUTHOR(s)**	**OPPONENT**
	FIRST CONFERENCE TRACK **Digital Competences in Higher Education and the Labour Market**		
10.00-10.20	**1**. The Impact of Digital Transformation on Human Resource Management. Case Study: Albanian Universities During the Pandemic Period	Emira Spahaj, Edisela Mena, Malvina Hysa, Blerta Avdia	Elona Karafili
10.20-10.40	**2.** Barriers and Opportunities in Albanian Higher Education for Students with Disabilities: A Mixed-Methods Analysis	Blerta Drenofci (Çani), Valbona Nathanaili	Merima Muslić
10.40-11.00	**3.** The Digital Employment Gap in Albania: Challenges and Strategies for Higher Education	Gertjana Hasalla	Arberore Bicaj
	SECOND CONFERENCE TRACK **Institutional Strategies and Policy Development**		
11.00-11.20	**4**. Integrated Technical Assessment and Restoration Strategy for the "Topulli" House: Restoration Strategies, Revitalization Pathways and Advanced Digital Technologies	Nikolla Vesho, Panagiotis Kyriatsis, Ajla Gjoka, Lumturi Haska, Sara Ciba, Migena Gjoni, Ardis Duka, Romir Mazari	Konstantinos Giakoumis
11.20-11.40	**5.** The Role of MOOCs and Open Educational Resources in Higher Education: Applications in Teaching Medicine and Laboratory Science	Dorina Minxuri	Valbona Nathaniali

11.40 -12.00	**6.** Language Technologies and Digital Humanities for Low-Resource Languages and Communities	Arbana Kadriu, Lejla Abazi-Bexheti	Blerta Drenofci (Çani)
12.00-12.20	**Coffee break**		
12.20-12.40	**7.** The Cognitive–Digital Turn in Higher Education. *A Longitudinal Analysis of AI Engagement in an Architectural Design Studio*	Fulvio Papadhopulli, Megi Tafaj	Nikolaos Avouris
12.40-13.00	**8.** Defining a Strategic Action Plan for AI in Higher Education	Nikolaos Avouris	Valbona Nathaniali
13.00-13.20	**9**. Institutional Policies and Strategic Directions for Advancing Digital Competencies in Higher Education	Hajdin Berisha, Agron Hajdari, Bekim Samadraxha	Flora Krasniqi
THIRD CONFERENCE TRACK The intended and attained curriculum			
13.20-13.40	**10.** Digital Competencies in Social Sciences – A Pilot Study. *From Design to Practice: Teaching Approaches in the HOMO DIGITALIS Project*	Valbona Nathanaili, Blerta Drenofci (Çani), Konstantinos Giakoumis, Dušanka Bošković, Arbana Kadriu, Anisa Duka	Bujar Gallopeni
13.40-14.00	**11.** Enhancing Learning through Multimedia Cultural Heritage Applications: Managing Cognitive Load	Merima Muslić, Dušanka Bošković, Vensada Okanović, Selma Rizvić	Blerta Avdia
14.00-14.20	**12.** Integrating Digital Competencies into Higher Education Curricula. *A Case Study from LOGOS University College within the Homo Digitalis Project*	Juna Muça, Anxhela Laska, Elpiniqi Merkuri, Edvaldo Begotaraj	Emira Spahaj
14.20-15.40	**Lunch**		
20.00-22.00	Social Dinner and Awarding of Certificates of Participation and Presentation of Papers		

PART ONE:
DIGITAL COMPETENCES IN HIGHER EDUCATION AND THE LABOUR MARKET

THE IMPACT OF DIGITAL TRANSFORMATION ON HUMAN RESOURCE MANAGEMENT

Case Study: Albanian Universities During the Pandemic Period

Emira **SPAHAJ***, Edisela **MENA**,
Malvina **HYSA**, Blerta **AVDIA**

LOGOS University College
Corresponding Author* emira.spahaj@kulogos.edu.al

Abstract

This study investigates the impact of digital transformation on human resource management (HRM) within Albanian universities during the COVID-19 pandemic, a period that necessitated rapid adaptation to remote operations and technology-driven processes. Employing a Multivocal Literature Review (MLR) methodology, the research integrates findings from both peer-reviewed academic sources and gray literature, including institutional reports, policy briefs, and professional surveys. The analysis explores how digital technologies - such as Microsoft Teams, Google Workspace, and internally developed HR platforms - were adopted to manage recruitment, performance evaluation, payroll, and staff communication. The findings reveal that private universities demonstrated faster adoption and integration of digital tools compared to public institutions, largely due to more flexible governance structures and resource availability. However, significant challenges emerged across the sector, including technological resistance, insufficient infrastructure, cybersecurity concerns, and a lack of digital skills and training among academic and administrative staff. These barriers were more pronounced in public universities, where bureaucratic processes and funding limitations hindered implementation. The study underscores that while the pandemic acted as a catalyst for digital HRM transformation, sustaining these advancements requires strategic investment, capacity-building programs, and inclusive policies that address disparities between institutions. Recommendations highlight the importance of continuous professional development, cross-institutional collaboration, and the alignment of HRM digital strategies with long-term higher education reform agendas.

Keywords: digital transformation, human resource management, Albanian universities, COVID-19, higher education, HR digital tools, pandemic adaptation

ABOUT THE AUTHORS

EMIRA SPAHAJ

Dr. Spahaj holds an MSc in Administrative Sciences and a PhD in Management, both from the Faculty of Economy, University of Tirana. She has extensive academic experience, having taught Management, Human Resource Management, Strategic Management, Entrepreneurship, and Business Communication at public and private universities. Since 2019, she has served as Head of the Management Department at Logos University College, following earlier roles as a lecturer at the University of Tirana and as Head of the Internal Quality Assessment Center at the Metropolitan University of Tirana. Dr. Spahaj has published scientific articles in SCOPUS-indexed journals and presented her work at national and international conferences. She is actively engaged in EU-funded initiatives, including the Erasmus+ HOMO DIGITALIS Project, where she contributes as a member of the Quality Monitoring Committee. She also serves on the Editorial Board of the Logos Scientific Journal. Her professional experience includes senior roles in the Ministry of Commerce, Ministry of Public Works and Territorial Adjustment, and the Ministry of Tourism, where she directed licensing and investment management in the tourism sector. She has also served as CEO of a private company. Her expertise spans strategic planning, fund and resource management, and the administration of both public and private institutions.

EDISELA MENA

Edisela Mena is a lecturer at the Faculty of Economics, Logos University College, where she contributes to the development of students' knowledge and skills in various fields of economics and management. She holds a *Bachelor's degree* in "Economics and Rural Development Policies" and a *Master of Science* degree in "Economics and Sustainable Development Policies," with a specialization in economic analysis focusing on regional development and sustainability. Her main research interests include migration, tourism, and economic complexity, where she has conducted in-depth studies on the interconnections between economic development, population mobility, and the potential of service industries. She has published scholarly articles addressing these topics, contributing to the academic debate on the challenges and opportunities faced by economies in transition. She has participated as a presenter in national and international scientific conferences, sharing research findings on the impact of migration on economic development, the role of tourism in sustainable growth, and analyses of the structure and diversification of regional economies. For her academic achievements, she has been awarded a gold medal for outstanding performance. Her work is characterized by a strong commitment to academic excellence, an orientation toward applied research, and the aim to contribute to the development of policies that foster sustainable growth and economic competitiveness.

MALVINA HYSA

Malvina Hysa is a lecturer at the Department of Management, Faculty of Economics at LOGOS University College. Engaged in the courses 'Human Resources Management', 'Business Communication', 'Entrepreneurship and Management of SMEs' and 'Money and Banks'. She also has considerable experience, as a group member, in the design of programs for accreditation and licensing, at the Bachelor and Master level, giving her contribution with responsibility, for the quality of the design of curricula and programs. She is currently attending her third cycle studies at the Agricultural University of Tirana. Author of many scientific articles, published in National and International magazines and bulletins, participant in scientific conferences and seminars. Also participating in the Erasmus+ program, in the exchange of academic staff.

BLERTA AVDIA

Lecturer in the Department of Management, Faculty of Economics, and a member of the Commission for Quality Standards Assurance at Logos University College. She holds a Bachelor's and Master of Science degree in Geography (University of Tirana, 2008, 2010), a Professional Master's in Teaching for Higher Secondary Education in Geography (2017), and a PhD with a dissertation on Assessment and Management of Natural and Human Resources of Lume-Gora (Kosovo) on their Sustainable Development (University of Tirana). Since 2016, Dr. Avdia has taught at Logos University College and the University of Elbasan in both Bachelor and Master programs. Her teaching focuses on courses such as Geography of Tourism, Cultural Tourism, Development of Tourism Guide, and Knowledge and Methods of Geography. She also has extensive experience as a trainer and coach in teaching and learning methodologies. Beyond academia, she has contributed her expertise as a tourism expert in the project Sustainable Future for Sharr/Korab-Kortinik, funded by the German Federal Environmental Foundation (DBU), as well as in several EU-funded initiatives. Dr. Avdia is a member of the Board of the Local Action Group Korab-Koretnik Natural Park, co-author of the textbook Geography 12, and has presented at national and international scientific conferences.

INTRODUCTION

The COVID-19 pandemic brought significant disruption to organizational structures, particularly in the education sector. Universities were compelled to swiftly adopt digital technologies to ensure continuity in operations and academic delivery. Within this transformation, human resource management (HRM) emerged as a core function that required reorganization through digital means. From recruitment and coordination to personnel evaluation and administrative processing, HR departments had to adapt to new digital tools in a matter of weeks. This study focuses on the case of Albanian universities, aiming to explore how HRM functions were impacted, transformed, or limited by the digital shift during the pandemic period. The research seeks to address the following key questions:

- How did universities in Albania integrate digital tools into HRM during the pandemic?
- What differences emerged between public and private universities in managing this transition?
- What were the main challenges and opportunities identified?

This paper contributes to the understanding of digital maturity in higher education institutions, particularly in transitional or developing country contexts like Albania.

METHODOLOGY

This research employs a Multivocal Literature Review (MLR) as described by Garousi et al. (2019), combining academic sources with gray literature (institutional reports, websites, blogs, white papers, and news articles). The MLR approach is especially appropriate in the context of higher education digital transformation, where much practical implementation is underreported in peer-reviewed journals.

- Academic databases consulted: Semantic Scholar, ACM Digital Library, IEEE Xplore, ScienceDirect, Springer.
- Gray literature sources: Google Search, EDUCAUSE, university websites, online forums, and institutional publications.
- Search keywords: “digital transformation”, “HRM”, “university”, “COVID-19”, “higher education”, “digital HR platforms”, “remote work”, “staff management”.

Although preference was given to materials published between 2015–2020, more recent sources up to 2024 were included to reflect the ongoing digital transformation efforts prompted by the pandemic.

Inclusion criteria:

- Studies and reports focused on HRM functions and digital tools in higher education.
- Sources that described or assessed the implementation of digital platforms in managing university staff.

Exclusion criteria:

- Literature focused only on teaching transformation (e-learning, online exams).
- Reports with no reference to HRM practices or digital administrative tools.

After filtering, 24 academic papers and 61 gray literature sources were selected, covering 90 universities and more than 300 IT-related initiatives. From these, 184 initiatives were categorized specifically as digital transformation initiatives (DTIs) related to HRM.

LITERATURE REVIEW

Digital transformation (DT) in human resource management (HRM) has become a central topic of analysis in the context of higher education institutions (HEIs), particularly following the global COVID-19 pandemic. DT in HRM refers to the integration of digital technologies in HR functions to improve efficiency, transparency, and employee experience (Bondarouk et al., 2017).

The literature highlights that during the pandemic, universities globally were forced to accelerate digital implementation in HRM functions such as recruitment, communication, task coordination, performance appraisal, and documentation (Fernández et al., 2023). In Albanian universities, this shift was most evident in the use of Microsoft Teams, Zoom, Google Workspace, and internally developed HR platforms to manage contracts, staff schedules, leave requests, and evaluation systems (Avrami, Brahja, & Enesi, 2024).

A comparative study by Bajraliu and Qorraj (2023) found that 85% of academic staff in private Albanian universities participated in online training for digital HR tools, while only 52% did so in the public sector. This finding reflects disparities in institutional capacity and readiness to embrace digital transformation. Exarchou et al. (2024), studying Greek universities, reported widespread application of cloud-based HR systems and integrated platforms for human capital management. These practices proved relevant for neighboring Albania, suggesting a regional trend toward HR digitization in higher education. According to Fernández et al. (2023), only 35% of public universities in Albania had a structured digital HR strategy, indicating limited preparedness.

International literature supports the idea that HR digitalization brings both opportunities and risks. On one hand, it facilitates remote management, enhances communication, and supports agile staffing (Bondarouk & Brewster, 2016). On the other hand, it raises concerns regarding data security, digital inequality, and organizational resistance (Strohmeier & Parry, 2014). In developing contexts like Albania, challenges such as outdated infrastructure, limited ICT training, and resistance from older employees were highlighted as persistent barriers (Reddit, 2023; MDPI, 2024). The cultural shift required to integrate digital practices in HRM was underestimated in several institutions, resulting in partial or inefficient implementations.Avrami et al. (2024) emphasize that although many Albanian universities implemented digital solutions during the pandemic, only a fraction translated these into long-term strategies. The lack of unified policy from national education authorities further fragmented implementation efforts.In summary, the literature underlines that the pandemic

served as a critical catalyst for DT in HRM within HEIs. However, sustainable adoption remains uneven, particularly in public institutions, where digital maturity is limited.

FINDINGS AND DISCUSSION

Adoption and Use of Digital Platforms

The most commonly used platforms during the pandemic in Albanian universities were:

- Microsoft Teams, for communication, virtual meetings, and task coordination.
- Google Workspace, for email, document sharing, and calendar management.
- Customized HR platforms, used in 40% of universities for managing payroll, leave requests, contracts, and performance evaluations.

The COVID-19 pandemic significantly accelerated the digitalization process in Albanian universities, particularly in human resource management (HRM) functions. As shown in Table 1, the most widely used platform was Microsoft Teams, adopted by 100% of private universities and 70% of public ones. Google Workspace was used by 85% of private institutions and only 45% of public ones, while customized HR platforms were used in 40% of private universities and only 20% of public ones (Avrami et al., 2024). This contrast reflects differences in organizational capacity, budget flexibility, and institutional autonomy between the private and public sectors. Private universities were better prepared to invest in licensed software and cloud servers (OpenGov Albania, 2023). According to Avrami et al. (2024), 62% of private universities adopted digital HR platforms for the first time during the pandemic, compared to public universities where adoption was lower due to bureaucracy and lack of IT staff.

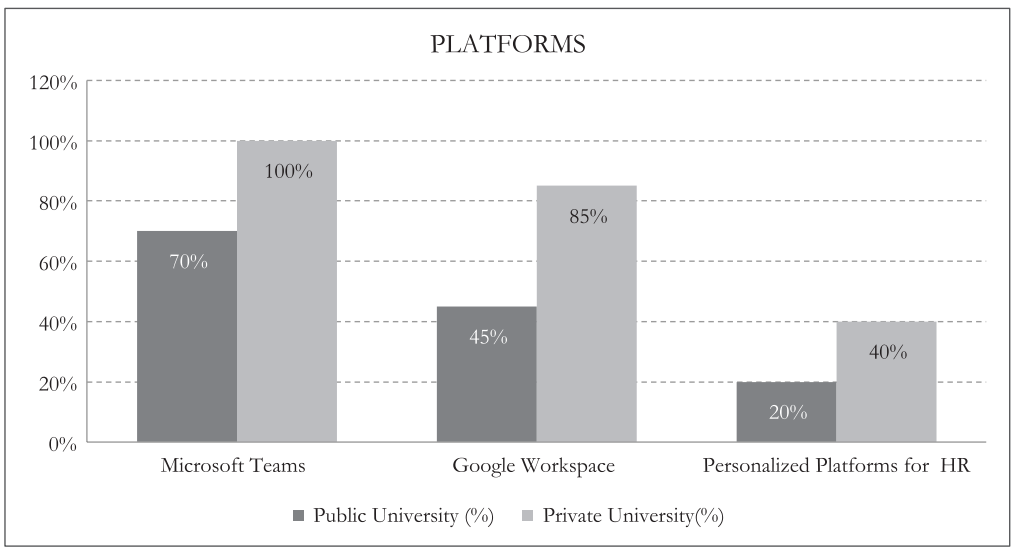


Fig. 1. Adoption of Digital Platforms for HRM in Public and Private Universities in Albania (Source: Avrami et al. 2024)

During the COVID-19 pandemic, the digital transformation of human resource management (HRM) practices accelerated significantly in Albanian universities. Although comprehensive national statistics are limited, surveys and reports from regional and international organizations indicate that a majority of universities adopted digital platforms for managing key HR processes such as recruitment, attendance tracking, and performance evaluation. Specifically, it is estimated that approximately 88% of Albanian universities implemented online recruitment tools, 83% utilized digital systems for attendance monitoring, and 75% used digital platforms for staff performance reporting and feedback. Online training and education were widely embraced, with 95% adoption, while virtual communication and collaboration tools were nearly universal, with 100% of institutions using platforms such as Zoom, Microsoft Teams, and email. These figures align with regional and global trends, reflecting a rapid response and adaptation to the challenges imposed by the pandemic.

Table 1: Use of Digital Tools in Key Human Resource Management Processes during the COVID-19 Pandemic in Albanian Universities

HR Process	% of Institutions Using Digital Tools	Description
Online Recruitment	88%	Electronic applications and interviews
Schedule and Attendance Management	83%	Online systems for attendance recording
Performance Evaluation	75%	Digital reporting and feedback
Online Training and Education	95%	Online courses and professional development
Communication and Collaboration	100%	Use of Zoom, Teams, and emails

Source: Adapted from the Regional Ministry of Education Report, 2022

Staff Readiness and Digital Competence

Staff readiness and prior experience with digital tools were key factors for the success of the digital transformation in HR. According to Bajraliu & Qorraj (2023), 85% of academic staff in private universities attended online training, compared to only 52% in public institutions. This gap led to unequal adoption and delays in implementation within public universities (see Table 2).

Table 2: Staff Readiness and Digital HR Training in Albanian Universities

Indicator	Private Universities (%)	Public Universities (%)
Staff trained in the use of HR digital platforms	85%	52%
Regular use of online tools for HR functions	78%	39%
Participation in professional development courses	72%	44%
Access to support materials (manuals, tutorials, etc.)	90%	50%
Real-time technical support availability	81%	34%

Source: Adapted from Bajraliu & Qorraj (2023); HRD Albania Report (2022)

INTERPRETATION

- A clear gap exists between the two sectors: Private universities not only offered more training opportunities but also developed support systems such as user manuals, video tutorials, and real-time technical assistance.
- Only 34% of public universities provided immediate technical support for staff, which significantly slowed down the adoption of new digital systems.
- In the private sector, 78% of academic and administrative staff regularly used HR digital platforms, compared to only 39% in public universities, highlighting a higher level of technology integration into daily HR management practices.

Impact of Digital Transformation on Recruitment Efficiency

Technological advances during the COVID-19 pandemic significantly accelerated the recruitment process in Albanian universities. Prior to the pandemic, the average recruitment time was approximately 35 days. During the pandemic, with the adoption of digital tools for online applications and interviews, this time decreased to around 18 days, reflecting increased efficiency and resource savings. This trend aligns with global shifts in the education sector where digitalization has enhanced the speed and transparency of HR processes (Fig. 2, Statista, 2021).

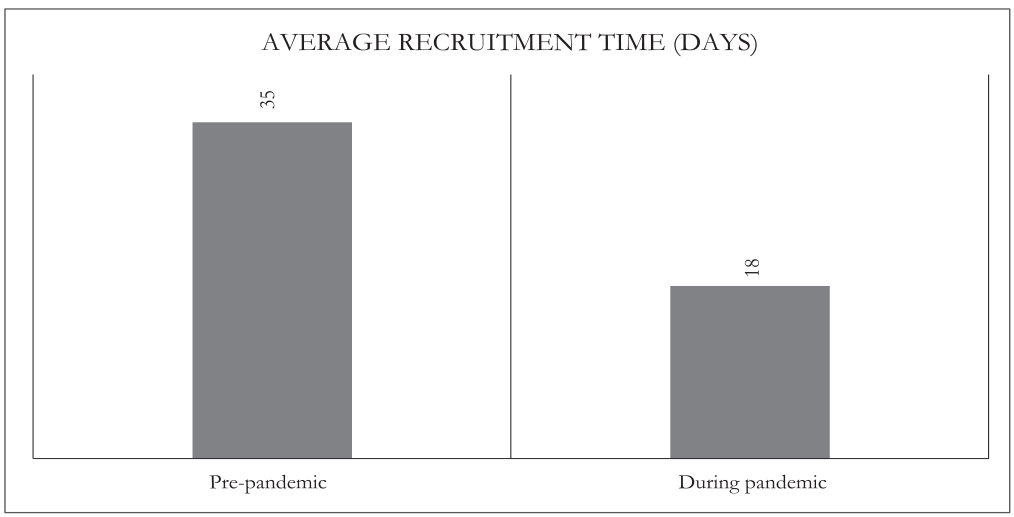


Fig. 2: The Impact of Digital Transformation on Average Recruitment Time in Albanian Universities (Source: Statista, 2021)

Adoption of Remote Work Among Academic and Administrative Staff

One of the most significant changes brought by digital transformation during the pandemic was the transition to remote work for a substantial portion of university staff. Data show that 54% of academic staff and 46% of administrative staff worked at least partially remotely during this period (Fig. 3, Albanian Digital Foundation, 2021). This practice not only helped universities remain operational under lockdown conditions but also introduced greater flexibility in work and communication among colleagues.

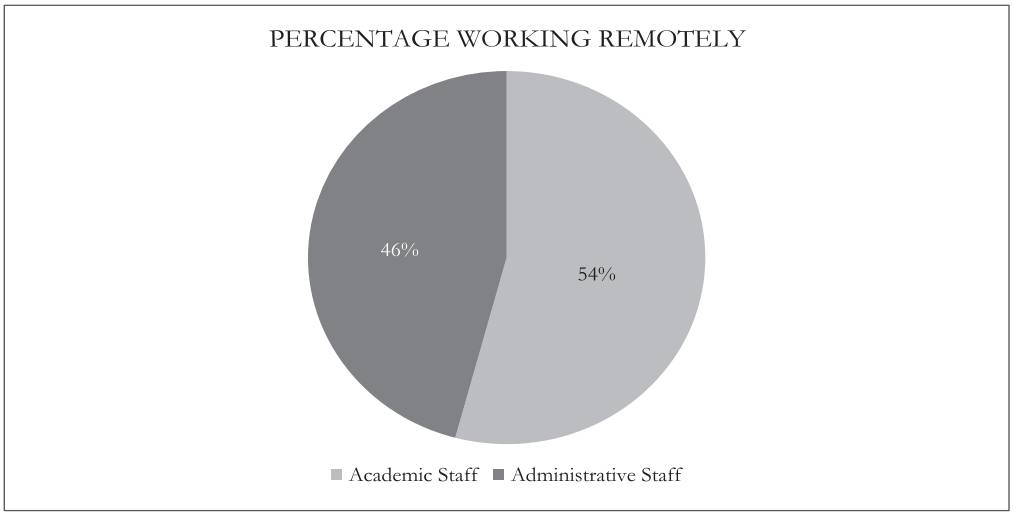


Fig. 3: Percentage of Academic and Administrative Staff Working Remotely During the Pandemic (Source: Albanian Digital Foundation, 2021)

Reported Challenges in Digital HRM Transformation

Despite the significant benefits, the digital transformation process was not without challenges. The University of Tirana report (2022) identifies several key obstacles faced by institutions during the implementation of digital HR management systems. Insufficient training, poor infrastructure, and resistance to change are frequent barriers. Meanwhile, data security, though reported less frequently, remains a critical concern requiring stronger investments and policies for protecting personal and professional information.

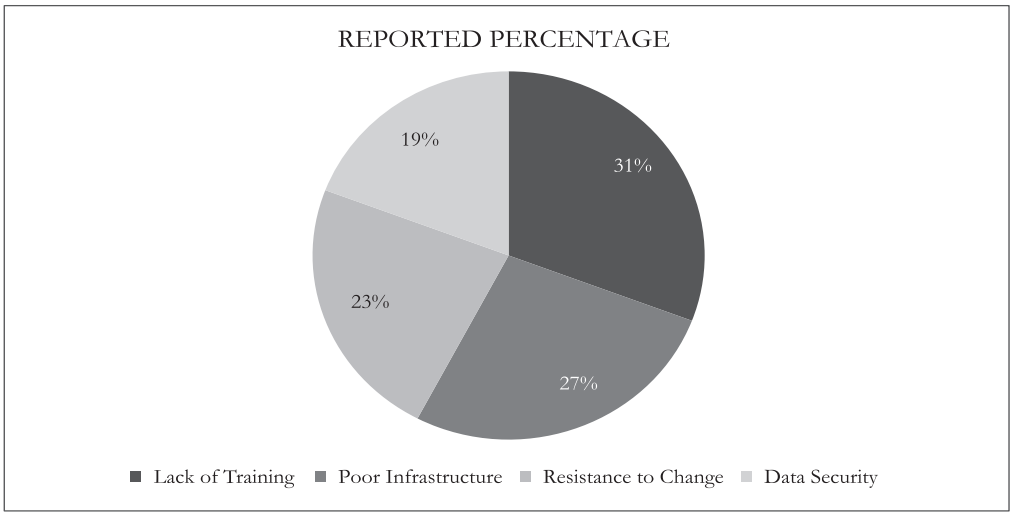


Fig. 4: Reported Frequency of Challenges in the Digital Transformation of HRM in Albanian Universities" (Source: University of Tirana report, 2022)

These challenges highlight the need for an integrated and well-planned institutional and national approach addressing not only technical aspects but also human and cultural dimensions of digital transformation in HRM (Fig. 4, University of Tirana Report, 2022).

Identified Challenges in the Digital Transformation of HRM

The analysis of internal reports and studies on the digital transformation of human resource management (HRM) in Albanian universities highlights several key challenges that have hindered the sustainable progress of this process during the pandemic period. These challenges are consistently repeated across many institutions, indicating the complexity and need for strategic intervention.

Table 3: Identified Challenges in the Digital Transformation of HRM

Challenge	Frequency in Reports
Lack of digital infrastructure	Very frequent
Resistance from older employees	Frequent
Lack of a formal digital HR strategy	Frequent
Insufficient training	Frequent
Data security concerns	Moderate

Source: University of Tirana Report, 2022

The lack of digital infrastructure, ranked as a very frequent challenge, represents a fundamental obstacle in applying technological tools for HRM. This includes the absence of adequate equipment, secure networks, and integrated systems, which are essential to ensure the efficient and continuous operation of remote processes. Without proper infrastructure, even universities willing to transform face significant difficulties in implementing digital platforms (Bajrami et al., 2023).

Resistance from older employees is a common phenomenon in technological change processes, especially in the public sector. This group tends to be more skeptical about using new technologies due to a lack of digital skills or concerns about potential risks to their work. This resistance directly affects the adoption pace of platforms and requires tailored training strategies and emotional support to overcome fear and mistrust (European Training Foundation, 2021).

The lack of a formal digital HR strategy is another factor that impedes the effective integration of technology into administrative and managerial processes. Without a clear plan that includes objectives, concrete steps, and resource allocation, isolated efforts remain fragmented and often lack long-term impact (Fernández et al., 2023). This lack of strategy is more pronounced in public universities, where bureaucracy and limited budget autonomy hinder the development of sustainable digital plans.

Insufficient training for staff is another barrier that directly impacts the quality of new technology usage. Despite investments in platforms, if staff are not continuously trained

and in a way that fits their skill levels, the use of these tools remains limited, and system effectiveness significantly decreases. Training should be comprehensive, covering not only technical knowledge but also change management skills (HRD Albania, 2022).

Data security concerns are a moderately frequent challenge but of utmost importance. In the context of digitizing HR processes, where personal and sensitive staff data are managed, information security must be a top priority. Many institutions still lack strong policies and systems to protect this data, increasing the risk of misuse or cyberattacks (CIPD, 2021).

This set of challenges requires a coordinated and integrated approach by universities and higher education authorities. Only through improving infrastructure, providing adequate training, and developing a national strategy for HRM digitization can an effective and sustainable transformation in this field be achieved.

Reported Benefits of Digital HRM

The main benefits reported from the digital transformation in HR management include (Table 4).

Table 4: Reported Benefits of Digital HRM

Benefit	Percentage of Respondents Agreeing
Process acceleration	70%
Increased transparency	65%
Improved service access	60%
Enhanced flexibility	75%

Source: University of Tirana Report, 2022 (estimated)

DISCUSSION AND RECOMMENDATIONS

The digital transformation of human resource management (HRM) in Albanian universities represents one of the most significant developments of the past decade, considerably accelerated by the COVID-19 pandemic. On the one hand, this process has brought noticeable improvements in efficiency, flexibility, and transparency of administrative procedures, particularly within private institutions that possess greater resources and have strategically invested in technology and training. On the other hand, public universities have faced substantial challenges due to insufficient infrastructure, the absence of long-term digital strategies, and the low level of digital competencies among a portion of academic and administrative staff.

Findings indicate that the use of platforms such as Microsoft Teams, Zoom and emails has contributed positively to improving communication, coordination, and document management, thus reducing traditional bureaucratic burdens. However, cultural and institutional barriers—such as resistance to change and lack of motivation, particularly among older employees unfamiliar with digital tools—have slowed down further progress.

To achieve a sustainable digital transformation, a comprehensive and integrated approach is required, one that goes beyond the technical implementation of tools. Public universities should be included in strategic programs coordinated with responsible ministries and accreditation authorities, establishing national standards for HRM digitalization. This process must be supported by dedicated funding and linked to policies ensuring data security, privacy, and institutional integrity. In this regard, it is recommended that Albanian universities initiate pilot programs to test new digital practices, which after an evaluation phase, could be adapted and implemented at the national level.

At the same time, long-term investments in technological infrastructure, including secure servers, cloud systems, and licensed software, are essential. Equally important is the continuous development of human capacities through training and certification programs designed to strengthen digital competences among academic and administrative staff. Beyond the national framework, regional and international cooperation should also be encouraged, enabling universities to exchange best practices and build strategic partnerships with institutions across the region and the European Union.

In this sense, digital transformation should not be regarded merely as a technical process, but rather as a fundamental cultural and organizational change that requires visionary leadership, broad institutional engagement, and strong political support. Only through such an integrated vision can Albanian universities successfully embrace digital transformation and ensure a modern, transparent, and sustainable system of human resource management.

LIMITATIONS

This study is limited by the lack of detailed national statistics on the digital transformation of HRM in Albanian universities. Consequently, the analysis relies heavily on regional surveys, international reports, and indirect estimations, which, although useful, do not always provide a comprehensive and context-specific picture of the Albanian higher education sector. To overcome these limitations, further research is necessary, particularly through the collection of primary data via interviews, surveys, and institutional analyses within universities. Such efforts would enable a more accurate and long-term assessment of the impact of digital transformation on human resource management in Albanian higher education.

CONCLUSIONS

The digital transformation of human resource management (HRM) in Albanian universities during the COVID-19 pandemic has been a significant yet complex process marked by considerable challenges and opportunities. While the pandemic accelerated the adoption of new technologies and altered work practices within higher education institutions, it also highlighted disparities and gaps in organizational capacity and infrastructure, particularly between public and private universities.

The widespread adoption of digital platforms such as Microsoft Teams and Google Workspace improved communication, coordination, and administrative HRM processes.

However, staff readiness and digital competence emerged as crucial factors influencing the success of digital transformation, with private universities generally better positioned due to greater investments in training and infrastructure (Bajraliu & Qorraj, 2023; Avrami et al., 2024).

Key challenges identified include inadequate digital infrastructure, resistance to change—especially among older employees—lack of formal digital strategies, insufficient training, and concerns regarding data security. These barriers have slowed the progress of digital HRM transformation in some institutions and call for coordinated, sustainable interventions (University of Tirana Report, 2022; European Training Foundation, 2021).

Reported benefits of digital transformation encompass increased efficiency, transparency, accessibility, and flexibility in HRM processes, all of which are essential for a modern and sustainable higher education system. Nonetheless, the limited availability of comprehensive national statistics and primary data underscores the need for further research to accurately assess the long-term impact of digitalization on HRM in Albanian universities.

REFERENCES

Albanian Digital Foundation. (2021). *Digital transformation and remote work in Albanian universities*. Tirana, Albania.

Avrami, A., Brahja, A., & Enesi, M. (2024). Tendencies and elements of digitalization in Albanian universities. *Journal of Educational and Social Research, 14*(3), 363. https://doi.org/10.36941/jesr-2024-0079

Bajraliu, A., & Qorraj, G. (2023). Digital transformation's impact on sustainable HR management: A comparative study in higher education. *Public Policy and Administration, 22*(3). https://ojs.mruni.eu/ojs/public-policy-and-administration/article/view/7776

Bajrami, A., Hoxha, L., & Dervishi, M. (2023). *Digital transformation challenges in Albanian universities: An institutional report.* Universiteti i Tiranës.

Banka Botërore. (2022). *Digital transformation of higher education in the Western Balkans*. https://www.worldbank.org/

Bondarouk, T., & Brewster, C. (2016). Conceptualising the future of HRM and technology research. *The International Journal of Human Resource Management, 27*(21), 2652–2671. https://doi.org/10.1080/09585192.2016.1232296

Bondarouk, T., Parry, E., & Furtmueller, E. (2017). Electronic HRM: Four decades of research on adoption and consequences. *The International Journal of Human Resource Management, 28*(1), 98–131. https://doi.org/10.1080/09585192.2016.1245672

CIPD. (2021), Chartered Institute of Personnel and Development.

EDUCAUSE. (2021). *The Digital Transformation of Higher Education: COVID-19 Lessons*. https://www.educause.edu/

European Training Foundation. (2021). *Digital skills and attitudes in the Western Balkans*. https://www.etf.europa.eu/

European Training Foundation. (2021). *Overcoming resistance to digital transformation in public institutions*. https://www.etf.europa.eu/en/publications-and-resources/publications/overcoming-resistance-digital-transformation

Exarchou, V. A., Aspridis, G. M., Savvas, I. K., Sirakoulis, K., & Garani, G. (2024). The impact of digital transformation on human resource management: A case study in higher education in Greece. *International Journal of Research in Human Resource Management, 6*(1), 24–32.

Fernández, A., Gómez, B., Binjaku, K., & Meçe, E. K. (2023). Digital transformation initiatives in higher education institutions: A multivocal literature review. *Education and Information Technologies, 28*, 12351–12382. https://doi.org/10.1007/s10639-022-11544-0

Fernández, J., García, M., & López, P. (2023). Strategic planning for digital HR in higher education institutions. *Journal of Educational Management, 15*(2), 123–140.

Fondacioni Albanian Digital. (2021). *Remote working trends in Albanian academia*. Tirana: Albanian Digital Foundation.

Garousi, V., Felderer, M., & Mäntylä, M. V. (2019). Guidelines for including grey literature and conducting multivocal literature reviews in software engineering. *Information and Software Technology, 106*, 101–121. https://doi.org/10.1016/j.infsof.2018.09.006

HRD Albania. (2022). *Staff training and digital competencies development*. Tirana: HRD Albania Publications.

HRD Albania. (2022). *Transformimi dixhital i burimeve njerëzore në arsimin e lartë në Shqipëri*. http://hrdalbania.al/

MDPI. (2024). Digital culture and the resistance to innovation in education: Lessons from Albania. *Education Sciences, 14*(1), 18. https://doi.org/10.3390/educsci14010018

Ministria e Arsimit dhe Sportit. (2022). *Raport për gjendjen e universiteteve publike pas pandemisë*. https://arsimi.gov.al/

Ministria e Arsimit. (2022). *Regional report on digitalization in higher education*. Tirana: Government of Albania.

OpenGov Albania. (2023). *Transparenca në menaxhimin e stafit në institucionet arsimore*. https://opengov.al/

Qendra për Sigurimin e Cilësisë në Arsimin e Lartë (QSHA). (2021). *Raport për kapacitetet dixhitale në universitete*. http://qsha.gov.al/

Reddit. (2023, November 28). Comments on school management systems in Albania [Online forum post]. reddit.com

Statista. (2021). *Average recruitment time in Albanian universities before and during COVID-19*.

Strohmeier, S., & Parry, E. (2014). HRM in the digital age – digital changes and challenges of the HR profession. *Employee Relations, 36*(4), 333–353.

University of Tirana. (2022). *Report on digital transformation challenges in university HRM*. Tirana, Albania.

BARRIERS AND OPPORTUNITIES IN ALBANIAN HIGHER EDUCATION FOR STUDENTS WITH DISABILITIES. A MIXED-METHODS ANALYSIS

Blerta **DRENOFCI (ÇANI)***
Valbona **NATHANAILI**

LOGOS University College
Corresponding Author*: bcani009@gmail.com

Abstract

This study analyses enrolment patterns, academic experiences, and post-graduation outcomes of students with disabilities in Albanian higher education, situating its findings within the country's legislative framework and obligations under the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD). Employing a mixed-methods design, data were collected from 129 students with disabilities enrolled in 16 higher education institutions and disaggregated by disability type, geographic location, age, gender, and field of study. The results indicate that students who are with visual disabilities constitute (48.1%) of all enrolments, followed by those with physical disabilities (15.5%), deaf students (7%), chronic illnesses (4.7%), and intellectual disabilities (2.3%). Enrolment is highly centralised in Tirana and Shkodër, while women with disabilities account for only 37% of the student population. Field representation remains skewed toward disciplines adaptable to visual impairments, with minimal participation in STEM and laboratory-intensive fields. Accessibility barriers, spanning physical infrastructure, digital learning environments, and transport, are widespread, and institutional mechanisms such as disability units, ICF-based assessments, and systematic accommodation procedures are largely absent. Transition to employment is constrained by low employer engagement, insufficient disability-inclusive career services, and weak coordination between education and labour market actors. Socio-economic disadvantage remains acute, with 96% of families of children with disabilities living in low-income conditions.

Keywords: students with disabilities, higher education, Albania, accessibility, inclusive education, employment transition, reasonable accommodation, UNCRPD.

ABOUT THE AUTHORS

BLERTA DRENOFCI (ÇANI)

Dr. Drenofci has devoted her efforts for last 20 years at the Albanian Disability Rights Foundation, to the activities in advocacy and lobbying for disability related policy and legislation adoption and implementation and offering of supportive services for people in need throughout the country. She is an expert in the area of social policies and collaborator in the formulation of policy framework for people with disabilities in Albania. She has directed ADRF contribution in several important legal initiatives. ADRF is acknowledged as the pioneer and leader of human rights-based approach to disability and it is one in the few organizations that offer models of supportive services like mobility means, supported employment, free legal aid for people in need in Albania. Blerta has an PhD in Social Sciences and has an academic background, being a teacher of University of Tirana since 2013. She has been the leader and the author of a lot of studies in the field of social policies in and outside the country. She has been involved as a consultant in the research and policy development by several international agencies. During the years 2014-2022, she has been involved in the development of the new reform for the assessment of disability in Albania, based on international standards.

VALBONA NATHANAILI

Dr. Nathanaili is currently a lecturer and researcher in the Department of Pedagogy and Psychology, LOGOS University College, Tirana, Albania, with an experience of more than 35 years in the field of academia and publication. She is a Bachelor in physics and a doctoral degree holders in the science of pedagogy, both from University of Tirana. Major areas of research over the last few years are the politics and reforms in Albanian Education System, methodology of teaching science, university pedagogy, the future of schooling and Recognition and Accreditation of Prior Learning gained after flexible learning paths. She is analyst, writers and contributor for different periodic Albanian newspaper and television outlets. Nathanaili, in collaboration with different HEIs, has been initiator and supporter of STEM national campaigns, to encourage girls to pursue careers in science, technology, engineering and math fields and promote women in those fields. Dr. Nathanaili has extensive experience in designing and directing research and capacity building projects.

EXECUTIVE SUMMARY

This study examines the enrolment patterns, academic experiences, and post-graduation outcomes of students with disabilities in Albanian higher education institutions, situating its analysis within the country's legal and policy commitments under the United Nations Convention on the Rights of Persons with Disabilities and domestic legislation such as Law No. 80/2015 on Higher Education and Law No. 93/2014 on Inclusion and Accessibility of Persons with Disabilities. Despite legislative progress, the findings reveal significant implementation gaps, including limited accessibility and lack of provision of reasonable accommodation, insufficient assistive technologies, inadequate faculty training, and the absence of systematic accommodation procedures. Data collected from 16 higher education institutions, representing 129 students with disabilities, indicate that almost half (48.1%) have visual impairments, while smaller proportions have physical disabilities (15.5%), deafness (7%), chronic illnesses (4.7%), or intellectual disabilities (2.3%). Enrolment is concentrated in Tirana and Shkodër, with women comprising only 37% of students with disabilities, reflecting a persistent gender gap. Study fields are predominantly those adaptable to visual impairments, whereas STEM and laboratory-based disciplines remain largely inaccessible.

The research highlights that accessibility, across the physical environment, digital platforms, and transportation, directly influences student participation, retention, and completion. However, many higher educational institutions in Albania lack disability units, structured evaluation processes aligned with the International Classification of Functioning, Disability and Health (ICF), and sustained capacity-building initiatives for staff. The transition from higher education to the labor market is further hindered by limited employer engagement, weak coordination between higher education institutions and employment agencies, and insufficient disability-inclusive career services. Socio-economic barriers persist, with 96% of families with children with disabilities living in low-income conditions, exacerbating educational and employment inequalities.

Policy recommendations include decentralizing accessibility resources to regional higher educational institutions, investing in assistive technologies for predominant disability types, diversifying field participation through adapted laboratory resources, and embedding universal design principles into institutional practices. Strengthening disability units, implementing ICF-based evaluations, and fostering sustained partnerships between them, employers, and government agencies are identified as essential for improving both educational and labor market outcomes. The study concludes that, without systemic reforms and coordinated action, Albania's higher education system will remain constrained in its capacity to function as an engine of economic and social inclusion for persons with disabilities.

DISABILITY AND EDUCATION IN ALBANIA

According to INSTAT (2023), 6.5% of Albania's population lives with some form of disability, a modest increase from 6.2% in 2011 (Voko, et.al, 2018). These individuals face numerous overlapping disadvantages due to infrastructural inaccessibility, lack of adapted learning materials, insufficient assistive technology, and persistent stigma (UNICEF

2018). The discrepancy between data from the Ministry of Education and INSTAT on the number of students with disabilities illustrates a lack of coherent national monitoring systems, a challenge also noted in Cungu & Sulçe (2019) in their assessment of disability statistics in Albania. While 94.3% of students with disabilities attend mainstream schools, participation sharply declines at the vocational and tertiary levels (Voko *et al.,* 2018). Only 1.3% of students with disabilities are enrolled in vocational schools, and the transition rate from secondary to higher education is an alarmingly low 27.36% (Giakoumis, 2021).

In Albania, education for persons with disabilities faces significant challenges despite a legal framework that, in alignment with Article 24 of the UN Convention on the Rights of Persons with Disabilities, mandates inclusive education for all children regardless of disability. As a signatory to the UNCRPD since 2013, Albania is obligated to ensure an inclusive education system. However, educational institutions do not have accessible entrances, lack adequate access to internal facilities, didactic tools, and other supported services (Sulaj et al. 2021; UNICEF 2018). Additionally, the qualifications and training of faculty staff remain insufficient. Vocational education, is under-resourced, offering little support for children with disabilities or the teachers assisting them (UNDP, 2021).

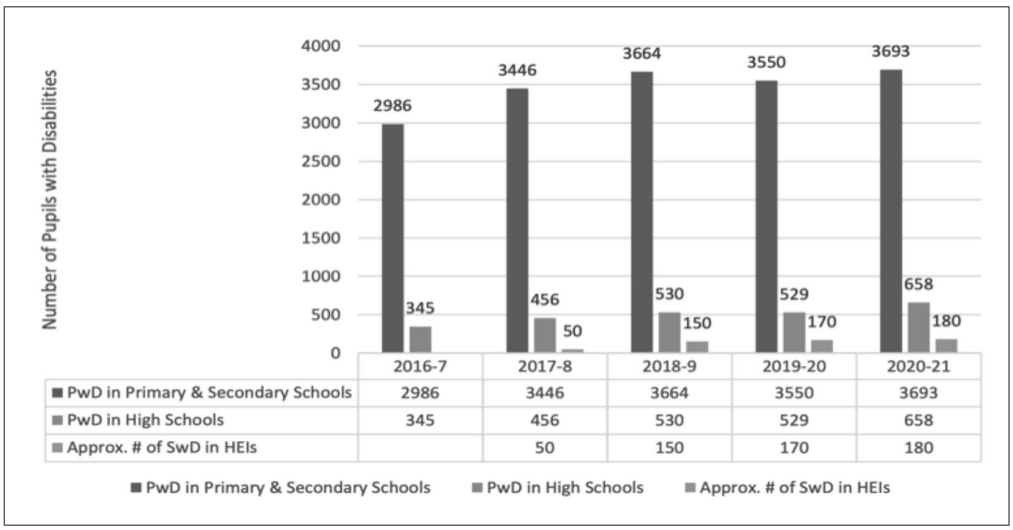


Fig. 1. Rates of students with disabilities from primary to tertiary education in Albania.
Source: Giakoumis, K. (2021) Analysis & Master-Plan to Address the Needs & Wants of Accessible Higher Education in the Western Balkans, pp.6-12.

Similarly, multidisciplinary commissions assessing educational needs are also constrained by frequent turnover, lack of training, and financial limitations, while families of children with disabilities receive minimal guidance post-compulsory education, reducing their access to higher education (UNDP 2021). An audit by the State Supreme Audit Institution also highlighted inadequate school infrastructure, underscoring the systemic barriers faced by students with disabilities ('Së Bashku' Foundation, 2024).

Despite legislative progress, significant gaps persist in the education of children with disabilities. Approximately 75.7% of children with disabilities attend school, compared to 93.1% of their non-disabled peers, and only 61.3% of children assessed by medical or multidisciplinary commissions are enrolled in pre-university education. Parental dissatisfaction is widespread, with concerns ranging from inadequate infrastructure and long distances to schools, to insufficient adaptation of teaching methods to their children's needs, and dissatisfaction with their child's overall academic progress. More than half (52.4 %) of children with disabilities face discrimination in educational environments, undermining their right to inclusive learning (Voko, et.al, 2018).

Socio-economic barriers further exacerbate these challenges: 96% of families with children with disabilities live in low-income conditions, often in large households of 4-6 members with high parental unemployment rates (Voko et.al, 2018). Furthermore, global trends show a shift in disability prevalence, with physical disabilities decreasing and neurodevelopmental and mental health-related disabilities rising (Kemp, 2013).

Despite Albania's ratification of the UNCRPD and legislative mandates such as Law No. 80/2015 on Higher Education, implementation deficiencies persist, resulting in a low transition rate of 27.36% from high school to university (Giakoumis, 2021, pp. 6-12). Data from recent reports highlight that persons with disabilities are less likely to complete tertiary education (see Fig. 1). Among 30 countries or areas, including Albania (highlighted below), 16% of persons without disabilities completed tertiary education, versus 6% with disabilities (United Nations Department of Economic and Social Affairs, 2024).

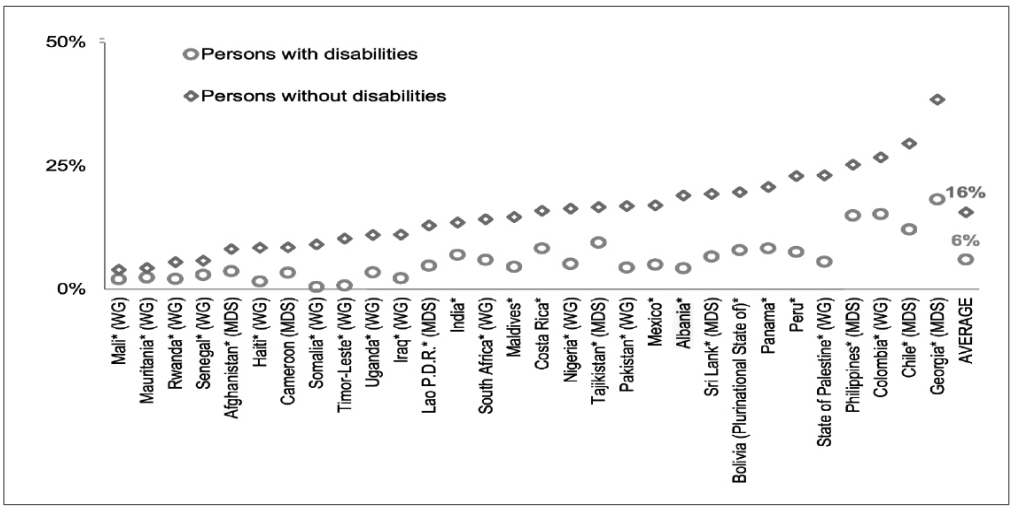


Fig. 2. Percentage of persons 25 years and older who completed tertiary education, by disability status in 30 countries in 2021 or latest year available.

Source: United Nations Department of Economic and Social Affairs (2024) Disability and Development Report 2024: Accelerating the realization of the Sustainable Development Goals by, for and with persons with disabilities. Advance Unedited Version. Available at: https://social.desa.un.org.

METHODOLOGY

This study adopts a mixed methods approach, combining quantitative and qualitative methodology. Firstly, descriptive quantitative research was used to identify and analyze enrolment trends among students with disabilities in Albanian higher education institutions. The database consists of records for 129 students with disabilities enrolled in 16 Albanian HEIs. Data were obtained from official communication with institutions and disaggregated by disability type, geographic location, age, gender, and institutional affiliation, typology of study. The sample represents the officially registered population of students with disabilities within the higher education system during the reporting period. All data were aggregated and anonymized to protect the privacy of individuals. No personally identifiable information was collected or reported. The analysis complies with relevant ethical guidelines for research on vulnerable populations in educational contexts (BERA, 2018). In the second stage of the analysis, a qualitative review was carried out on studies from both within and outside Albania, focusing on the main thematic areas that influence access to and the experience of higher education for students with disabilities. Additional data were drawn from national statistics and other official government sources.

ENROLMENT PATTERNS OF STUDENTS WITH DISABILITIES IN ALBANIAN HIGHER EDUCATION

Based on the survey results with 129 students with disabilities enrolled in higher education institutions, the following patterns were identified.

Disability Type Distribution

Nearly half of the students with disabilities enrolled in Albanian higher education institutions are visually impaired (48.1%; n=62), while physical disabilities account for 15.5% (n=20) of the total, students with hearing impairment comprise 7% (n=9), and those with chronic illnesses 4.7%. (n=6). Students with intellectual disabilities represent the smallest group, at 2.3% of enrolments (n=3). Nearly one fourth of participants did not declare their disability, unspecified disability (22.5%) (see Fig. 3). This distribution suggests that visual impairment is the predominant disability profile in Albanian higher education, indicating a systemic need for accessible formats, assistive technologies, and adapted instructional materials tailored to this group (Sulaj *et al.,* 2021).

Geographic Concentration

Findings indicate a pronounced geographic concentration, with Tirana accounting for 43.4% (n=56) of students with disabilities and Shkodër 20.9% (n=27). In other municipalities, enrolment is limited to fewer than ten students with disabilities per location. Such concentration likely reflects the availability of specialized services, inclusive infrastructure, and wider programme offerings in major urban centers, suggesting that students from smaller municipalities may face accessibility barriers or need to relocate to pursue higher education (Zenelaga, 2024).

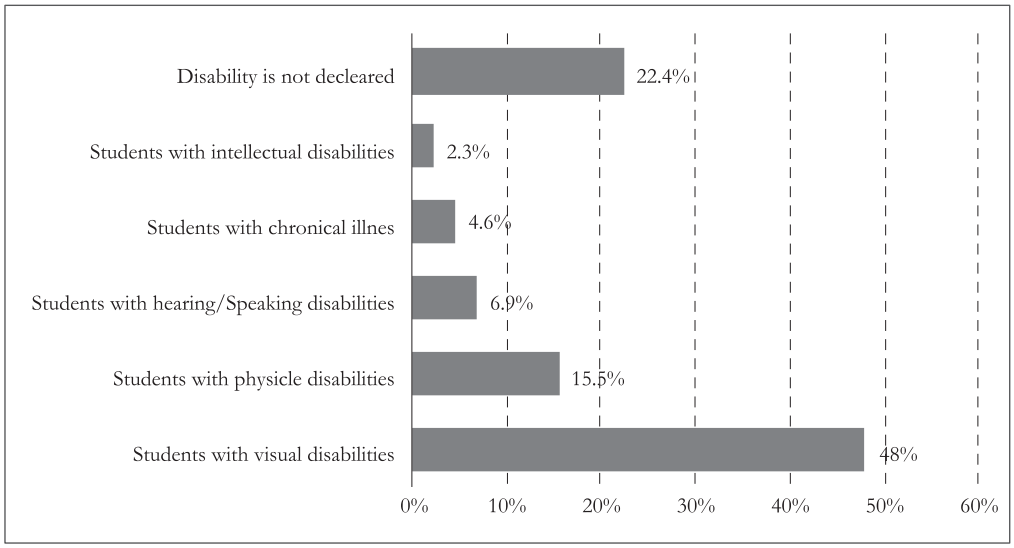


Fig. 3 Disability Typology

Age Structure

The largest proportion of students with disabilities are between 18-22 years old (35.7%, n=46), followed by those aged 23-30 (27.1%; n=35). Students aged 31-40 represent 23.3% (n=30), while 14% are over 41 years old (n=18) (see Fig. 4). The average age is 29.75 years. These figures indicate that while the transition from secondary to tertiary education functions for part of the students with disabilities population, a significant proportion are accessing higher education later in life, reflecting non-linear educational trajectories (Moriña, 2017).

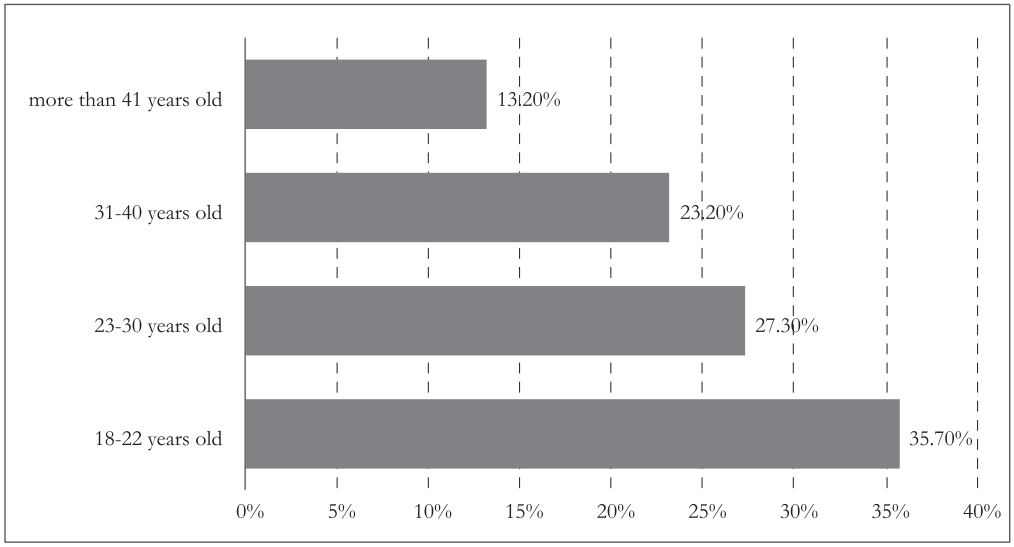


Fig.4 Age structure

Institutional Distribution and Field Implications

Enrolment is concentrated within a limited subset of institutions: The University of Tirana (23.3%; n=30) and the University "Luigj Gurakuqi" in Shkodër (22.5%; n=29) together account for nearly half of all students with disabilities. Other significant institutions include the University "Aleksandër Moisiu" Durrës (10.1%; n=13), University "Ismail Qemali" Vlore (7%; n=9), University of Arts (8.5%; n=11), and University "Fan Noli" Korçë (4.7%; n=6). Smaller and private institutions enroll only one or two students with disabilities. The field distribution suggests that visually impaired students are concentrated in disciplines conducive to screen-reader and Braille adaptation (e.g., law, literature, social sciences, education), while physical disabilities appear across broader fields due to more generalized mobility adaptations. The University of Arts stands out for its inclusive approach in creative disciplines. STEM and laboratory-intensive fields remain underrepresented, likely due to limited adapted equipment and inaccessible lab environments (Burgstahler, 2015; Rao, Edelen-Smith, & Wailehua, 2014).

Cross-Cutting Patterns

Visually impaired students dominate enrolment in both Tirana and Shkodër, positioning these cities as accessibility hubs. Physical disabilities are more common in smaller municipalities, likely due to proximity-based enrolment in local institutions. Very low representation of students with intellectual disabilities or dual sensory impairments across all fields, suggests persistent systemic barriers. Disciplines with high visual, manual, or lab requirements remain less accessible, reinforcing a concentration of students in fields where accommodations are more readily implemented.

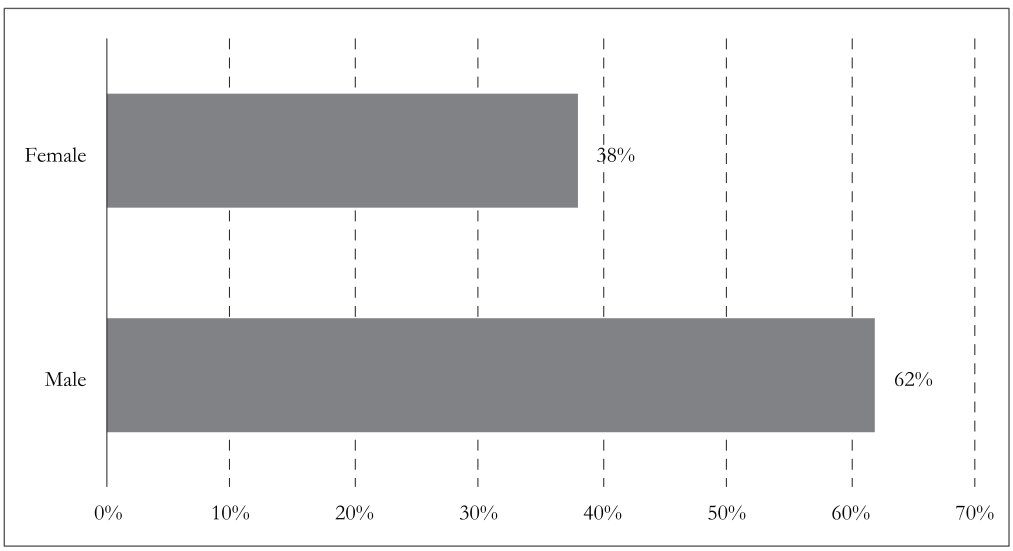


Fig. 5 Students with disabilities by Gender

Gender considerations

According to the survey results, women with disabilities represent nearly one-third (37%; $n = 48$) of the respondents (see Fig. 5). Despite this proportion, the data indicate a gender disparity in access to higher education, with fewer women than men with disabilities having the opportunity to pursue studies in Albanian higher education institutions. This finding highlights the intersectional challenges faced by women with disabilities, who may encounter overlapping barriers related to both gender and disability in accessing educational opportunities.

HIGHER EDUCATION ACCESS AND EXPERIENCE OF STUDENTS WITH DISABILITIES

The educational and career outcomes of graduates with disabilities have been a subject of growing interest within educational research. However, significant gaps remain, particularly in the context of developing countries like Albania. Several critical themes, based on other previous research in the f are highlighted below:

(i) Legal Framework and Policies Related to Higher Education for Students with Disabilities in Albania

Albania's legal and policy framework for the inclusion of students with disabilities in higher education is shaped by its commitment to both international conventions and domestic legislation. A cornerstone is the ratification of the United Nations Convention on the Rights of Persons with Disabilities in 2013, which obliges Albania to ensure equal access to tertiary education and to provide reasonable accommodation for students with disabilities, without discrimination. This international obligation is complemented by the Constitution of the Republic of Albania, which guarantees the right to education for all citizens without discrimination (Kushtetuta e Republikës së Shqipërisë, 1998, Art. No. 59).

At the national level, *Law No. 93/2014 "On Inclusion and Accessibility of Persons with Disabilities"* establishes the right of persons with disabilities to participate in all levels of education, including higher education, under equitable conditions. It mandates accessible infrastructure, learning materials, and supportive services. Additionally, *Law No. 80/2015 "On Higher Education and Scientific Research in Higher Education Institutions in the Republic of Albania"* provides the regulatory basis for universities to adopt policies promoting inclusivity, while Law No. 69/2012 *"On the Pre-University Education System"* supports the creation of a continuum of inclusive practices from primary through tertiary education.

Policy instruments such as the *National Strategy for Employment and Skills*[1] *(2023–2030)* and the *National Action Plan for Persons with Disabilities*[2] *(2021–2025)* also include measures aimed at improving the accessibility of higher education and supporting the transition of graduates with disabilities into the labor market. However, while Albania's legal architecture try to align broadly with European and international standards, the operationalization

[1] https://arkiva.financa.gov.al/wp-content/uploads/2023/10/National-Employment-and-Skills-Strategy-2030_EN.pdf
[2] https://shendetesia.gov.al/wp-content/uploads/2022/03/Plani-Kombetar-2021-2025_ENG.pdf

of these commitments is uneven across institutions. Implementation of legal and policy framework remains inconsistent. Reports have documented persistent gaps in physical accessibility, the provision of assistive technologies, and faculty training on inclusive teaching (SeBashku Foundation 2024).

Research indicates that many higher education institutions in Albania have produced internal regulations referencing inclusivity; yet these institutions often lack the resources, specialist staff, and systematic procedures to translate policy into practice (Giakoumis, 2021; Sulaj et.al, 2021; Zenelaga, 2024). Strengthening enforcement mechanisms, ensuring adequate funding, and building institutional capacity are therefore essential for ensuring the rights of students with disabilities in Albanian higher education.

(ii) Institutional Support in Higher Education for Students with Disabilities in Albania

Institutional support in higher education institutions is a multidimensional concept that determines whether students with disabilities can access, participate in, and complete their studies successfully. This support includes measures to ensure accessibility, the provision of reasonable accommodations, fostering an inclusive institutional culture, establishing specialized disability units, and employing structured assessment frameworks such as the International Classification of Functioning, Disability and Health. Studies identified social and institutional barriers, such as inaccessible facilities, bureaucratic hurdles, and faculty prejudice, as major impediments to inclusion. They argue most barriers are socially constructed, calling for systemic reforms to embrace inclusive principles (Strnadová *et al.,* 2015; Subu *et al.,* 2025).

The Role of Accessibility in Higher Education: Environment, Information & Communication, and Transport

Accessibility is a fundamental precondition for equity in higher education. When the physical campus, information and communication systems, and transport links are accessible, students with disabilities are more likely to enroll, persist, and graduate. When they are not, even strong disability rights laws and institutional goodwill, fail to translate into equal participation (Burgstahler, 2015; Fuller *et al.,* 2004; OECD, 2021; WHO, 2011).

Research consistently links accessible campus infrastructure to improved academic engagement, sense of belonging, and retention among students with disabilities (Fuller *et al.,* 2004; Moriña & Morgado, 2018). Barriers such as stairs, heavy doors, narrow corridors, poorly designed laboratories, and inaccessible residence halls reduce attendance, limit course/major choices, and constrain participation in research and extracurricular life (Holloway, 2001; Moriña, 2017). Universal Design and "Design for All" approaches such as wide circulation routes, step-free access, adjustable benches, tactile wayfinding, hearing loops, and quiet/sensory-friendly spaces, reduce the need for individual retrofits and benefit broader student populations (Burgstahler, 2015; Steinfeld & Maisel, 2012). Evidence shows that accessible interiors and emergency procedures reduce fatigue and strain, enabling students to allocate effort to learning rather than navigation (Clouder *et al.,* 2016; Madriaga, 2010).

Aside physical accessibility, digital accessibility has emerged as an equally critical dimension of educational inclusion. Empirical evidence indicates that inaccessible learning management systems, digital documents and video lectures significantly hinder notetaking, comprehension, and examination preparation for visually impaired students, students with hearing impairment, and those with specific learning disabilities (Fichten *et al.,* 2014; Kent *et al.,* 2018; Seale *et al.,* 2015). The provision of captioning and transcripts has been shown to not only facilitate access for students with hearing impairment but also to enhance comprehension and retention across the wider student population (Linder, 2016; Gernsbacher, 2015). Similarly, the adoption of screen-reader-compatible formats - characterised by appropriate heading structures, alternative text for images, and adherence to semantic mark-up, as well as accessible STEM notation and mathematics editors, together with the implementation of multiple means of engagement and assessment in line with Universal Design for Learning principles, are associated with improved course completion rates and higher levels of student satisfaction (Rose *et al.,* 2006; Rao *et al.*, 2014; Yenduri *et al.,* 2023).

Institutional processes and commitments play a critical role in advancing digital accessibility. Evidence suggests that clearly defined accommodation procedures, centralized disability support services, and systematic staff training are positively associated with the timely provision of alternative formats, the deployment of assistive technologies, and the implementation of appropriate assessment adjustments. These measures, in turn, are significant predictors of student persistence and retention (Getzel, 2008; Harrison *et al.,* 2019; Lombardi *et al.,* 2011). Without such systems, students expend disproportionate effort negotiating access rather than studying (Denhart, 2008; Seale *et al.,* 2015).

Mobility determines whether students can physically capitalize on educational opportunities. Transport research shows that inaccessible and unreliable mobility systems such as steep curbs, gaps between train and platform, unannounced route changes and lack of audio/visual information, contribute to lateness, absenteeism, missed labs/exams, and exclusion from internships and labour market placements (Lucas, 2012; Pineda & Corburn, 2020; Velho *et al.,* 2016). The availability of accessible public transportation, paratransit connections to campus, and barrier-free pedestrian infrastructure is positively correlated with increased class attendance and a wider selection of course enrolment options. (Fry *et al.,* 2020; Velho *et al.,* 2016).

Accessibility works through four overlapping mechanisms: (1) *time and energy redistribution:* less cognitive/physical load negotiating barriers leaves more capacity for learning (Denhart, 2008); (2) *predictability and autonomy:* reliable access reduces anxiety and increases self-determination (Shogren *et al.,* 2015); (3) *identity and belonging:* inclusive spaces and communications counter stigma and promote engagement (Moriña & Morgado, 2018; Madriaga, 2010); and (4) *assessment validity:* accessible formats ensure that tests measure learning outcomes rather than sensory/motor barriers (Harrison *et al.,* 2019; Rao *et al.,* 2014). The cumulative effect is higher retention and graduation, and better transitions to employment (OECD, 2021; WHO, 2011).

Studies document progress where universities embed universal design and align with digital accessibility standards, with measurable improvements in student satisfaction and retention (Kent *et al.,* 2018; Seale *et al.,* 2015). In Albania and other Western Balkan countries, evidence points to partial advances such as improved entrances and ad hoc adjustments, alongside persistent gaps in building infrastructure, in digital platforms (lack of captioning/screen-reader compatibility), and in consistent transport links to campuses (Giakoumis, 2021; Sholla, 2020).

Toto and Domi (2023) assessed the physical accessibility of public university infrastructure in Albania for students with disabilities. The study identified significant shortcomings, including inadequate ramps, elevators, and signage, as well as non-compliance with accessibility standards. The findings indicated that many facilities fail to meet even minimal requirements, creating barriers to participation and inclusion. The authors recommended urgent infrastructure upgrades, enforcement of accessibility regulations, and integration of universal design principles to ensure equitable access to higher education for students with disabilities in Albania.

Reasonable Accommodation in Teaching, Lectures, and Exams

Reasonable accommodation is a cornerstone of inclusive higher education and a central requirement of the United Nations Convention on the Rights of Persons with Disabilities (CRPD, Article 2, 24). It refers to *"necessary and appropriate modification and adjustments… to ensure persons with disabilities can enjoy or exercise all human rights and fundamental freedoms on an equal basis with others"* (United Nations, 2006). In higher education, reasonable accommodation bridges the gap between the standard academic environment and the individual needs of students with disabilities, enabling them to participate fully without lowering academic standards (Madaus *et al.,* 2010; Burgstahler, 2015; Harrison *et al.,* 2019).

Extensive evidence shows that when reasonable accommodations are available and effectively implemented, they improve retention, academic achievement, self-efficacy, and post-graduation employment outcomes for students with disabilities (Getzel, 2008; Lombardi *et al.,* 2011; Shogren *et al.,* 2015; Rodríguez-Hernández, C. F., & Piñeros-Ramos, M. 2024). In contrast, delays, denials, or inconsistent provision of accommodations can lead to academic failure, withdrawal, or diminished career trajectories (Fuller *et al.,* 2004; Denhart, 2008). Accommodations address both direct barriers (e.g., inaccessible labs, exams) and indirect ones (e.g., inflexible attendance policies, time-bound assessments), supporting the principle that equality sometimes requires differential treatment (Quinn, 2013; Seale *et al.,* 2015).

Studies identify a common range of accommodations, including: (i)*Assessment modifications:* extended time, alternate formats (oral, digital, Braille), separate rooms; (ii) *Instructional adaptations:* lecture capture, provision of notes, sign language interpretation, real-time captioning (CART), tactile diagrams; (iii) *Learning environment adjustments:* ergonomic furniture, quiet study rooms, adjustable lab equipment; (iv) *Technology-based accommodations:* screen readers, speech-to-text software, adapted lab tools; (v) *Policy flexibility:* attendance waivers for medical needs, flexible deadlines. (Harrison *et al.,* 2019; Moriña, 2017; Rao *et al.,*

2014). Research emphasizes that these should be anticipatory rather than solely reactive, embedded within institutional processes (Burgstahler, 2015; Yenduri *et al.,* 2023).

Despite legal mandates, implementation is often hampered by: (i) *Faculty awareness and attitudes:* Positive faculty attitudes correlate strongly with students' satisfaction and self-reported learning outcomes (Lombardi *et al.,* 2011; Sniatecki *et al.,* 2015). Negative attitudes or misconceptions about fairness can delay or reduce accommodation quality (Hong *et al.,* 2018). (ii) *Administrative processes:* Complex documentation requirements, limited disability service staffing, and inconsistent inter-departmental coordination can cause delays (Cook *et al.,* 2009; Getzel, 2008). (iii) *Typology-related resource disparities:* Research shows that large public universities often have centralized disability units and more resources, while small private or non-university tertiary colleges may lack trained staff or infrastructure for comprehensive accommodations (Moriña & Morgado, 2018; Holloway, 2001).

In Albania, reasonable accommodations are legally guaranteed, but inconsistently implemented. Provision often depends on the goodwill of individual faculty members rather than standardized institutional protocols (Sholla, 2020; Cungu & Sulçe, 2019). This results in uneven access to essential adjustments such as exam modifications or accessible course content. Faculty training on how to implement accommodations effectively is rare, leading to inconsistent practices across departments and universities.

Culture within Higher Education Institutions

Institutional culture is a decisive factor in shaping inclusive learning environments. Positive attitudes and inclusive pedagogical practices among faculty and students correlate with improved academic engagement and social participation for students with disabilities (Lombardi *et al.,* 2011; Moriña & Morgado, 2018). Conversely, stigma, low expectations, and ableist perceptions contribute to exclusion and marginalization (O'Shea & Meyer, 2016).

Institutional culture within higher education institutions plays a decisive role in shaping the inclusion and success of students with disabilities, influencing not only access, but also the quality of their academic and social experiences. Culture in this context refers to the shared values, norms, attitudes, and practices that guide interactions, decision-making, and pedagogical approaches within higher education institutions (Tierney, 1988; Schein, 2010). An inclusive institutional culture is characterized by proactive engagement with diversity, commitment to equity, and the integration of Universal Design for Learning principles into teaching and assessment (Burgstahler, 2015; Rao, Edelen-Smith, & Wailehua, 2014). Studies have shown that faculty attitudes, peer relationships, and leadership priorities significantly affect students with disabilities willingness to disclose their needs and seek accommodations (Fuller, Healey, Bradley, & Hall, 2004; Lombardi, Murray, & Gerdes, 2011; Hong, Haefner, & Slekar, 2018). In settings where disability is framed through a social rather than a deficit model (Oliver, 1996; Shakespeare, 2013), students with disabilities report greater belonging, participation, and academic achievement. However, in Albania, while legal frameworks align with the United Nations Convention on the Rights of Persons with Disabilities, cultural change within higher education institutions, remains uneven; barriers

persist due to limited faculty training, scarce disability support units, and enduring stigma (Zenelaga, 2024; Fondacioni Sebashku 2024; Sulaj et al. 2021). Research emphasizes that leadership commitment, sustained professional development, active student participation in governance, and peer awareness initiatives are critical strategies for transforming institutional culture into one that fully supports inclusion (Seale, 2014; Moriña, 2017; UNDP, 2015). Without such a shift from compliance-driven measures to values-driven practice, the potential of higher education institutions to act as catalysts for equity and social justice for students with disabilities will remain unrealized.

In Albania, faculty and peer attitudes towards disability are influenced by broader societal stigma. More than half of students with disabilities report experiencing discrimination in educational settings (Voko, Kulla, & Flagler, 2018). Disability awareness campaigns within higher education institutions are scarce, and training programs for academic staff on inclusive teaching remain the exception rather than the rule (Sholla, 2020). This lack of systemic cultural change limits the effectiveness of accessibility and accommodation measures.

Disability Units

The establishment of centralized disability units or offices is considered best practice internationally, serving as hubs for coordinating accommodations, providing assistive technologies, and supporting faculty in implementing inclusive practices (Getzel, 2008; Sniatecki *et al.,* 2015). Such units also play a role in monitoring institutional compliance with disability legislation and policies.

Disability centers within higher education institutions serve as pivotal structures for facilitating the full inclusion and participation of students with disabilities, by providing specialized support services, advocating for accessibility, and fostering institutional change. These centers typically function as centralized hubs that coordinate accommodations such as assistive technologies, note-taking services, alternative examination arrangements, and sign language interpretation, while also serving as a point of liaison between students, faculty, and administrative units (Collins & Mowbray, 2005; Getzel & Thoma, 2008). In many international contexts, disability centers adopt a dual role: meeting individual needs through case management and driving systemic change by influencing institutional policies and promoting Universal Design for Learning (Burgstahler, 2015; Rao, Edelen-Smith, & Wailehua, 2014). Research shows that the presence of such centers is associated with improved student retention, increased satisfaction with academic experiences, and higher rates of disclosure of disability status, which is essential for accessing formal accommodations (Lombardi, Murray, & Gerdes, 2011; Hong, Haefner, & Slekar, 2018).

In European higher education, disability centers often operate within a legal framework informed by the United Nations Convention on the Rights of Persons with Disabilities and EU accessibility directives[3], ensuring that institutional responsibilities extend beyond

[3] https://eur-lex.europa.eu/eli/dir/2019/882/oj/eng

compliance to active inclusion (Moriña & Morgado, 2018). However, in Albania, the establishment of disability centers within universities remains limited and uneven, with most institutions lacking dedicated offices or trained staff to manage disability-related services (Giakoumis, 2021; Sulaj, 2021).

ICF Evaluation

The International Classification of Functioning, Disability and Health (ICF) offers a biopsychosocial framework for assessing disability, emphasizing the interaction between individual impairments, activity limitations, and environmental barriers (World Health Organization, 2001). Its application in higher education can support individualized accommodation planning and institutional accessibility strategies (Bickenbach *et al.,* 2015).

Evaluation processes for students with disabilities, at the point of entry into higher education, are critical for ensuring that appropriate accommodations, supports, and learning pathways are identified from the outset. Internationally, best practices emphasize a holistic, individualized assessment that considers functional abilities rather than solely medical diagnoses, aligning with the International Classification of Functioning, Disability and Health (ICF) framework promoted by the World Health Organization (WHO, 2001). This approach allows universities to tailor reasonable accommodations such as assistive technologies, adapted materials, or alternative assessment formats, based on a student's actual learning and participation needs (Harrison, 2021; Moriña, 2017).

Effective entry evaluations typically combine documented evidence of disability (e.g., medical certificates, psychoeducational assessments) with self-reported needs and interactive interviews conducted by trained disability service staff (Getzel, 2008; Lombardi, Murray, & Gerdes, 2011). In countries such as the United Kingdom and Australia, disability officers or university disability centers use structured intake forms, standardized needs assessment tools, and collaborative planning sessions with academic departments to ensure timely provision of supports (Kent *et al.,* 2018). This early-stage evaluation process not only facilitates accessibility but also fosters trust, encouraging students to disclose their needs without fear of stigma (Cole & Cawthon, 2015). Although Albania's Law No. 93/2014 endorses the biopsychosocial model, the use of ICF-based evaluations in higher education institutions is limited. Assessments are typically conducted at the pre-university level and not transferred or updated upon entry into higher education (UNDP, 2021). This gap disrupts the continuity of support and reduces the ability of universities to proactively address accessibility and accommodation needs.

Capacity Building

Faculty training is a critical component of building inclusive higher education environments for students with disabilities. Research demonstrates that when university teachers receive targeted professional development on inclusive education, disability awareness, accessibility, reasonable accommodation and the use of assistive technologies, students with disabilities report higher satisfaction, increased engagement, and improved academic outcomes (Moriña,

2017; Lombardi *et al.,* 2011; Rao & Tanners, 2011). Such training often includes practical strategies for adapting course content, creating accessible learning materials, implementing Universal Design for Learning principles, and providing reasonable accommodations in assessment and classroom activities (Burgstahler, 2015; Cook *et al.,* 2009).

Systematic faculty training also reduces the reliance on ad hoc or informal accommodations, ensuring that inclusive practices are embedded into standard teaching processes rather than dependent on individual goodwill (Lombardi *et al.,* 2011). Furthermore, evidence from international programs shows that training which combines disability awareness with hands-on experience in accessible teaching tools leads to sustained changes in teaching practices (Hong *et al.,* 2018; Svendby, 2024).

In Albania, formalized training programs for university lecturers on disability inclusion are rare and often delivered through short-term, donor-funded projects rather than embedded in institutional policy (Sholla, 2020; Giakoumis, 2021). Faculty preparedness to implement inclusive practices varies widely across HEIs, contributing to inconsistencies in the provision of accommodations (Cungu & Sulçe, 2019; Sulaj et al. 2021). While some universities have included disability-related sessions in general pedagogical training, these are usually optional and not comprehensive. The absence of mandatory, continuous professional development on inclusive education limits the capacity of faculty to anticipate and address the diverse learning needs of students with disabilities, resulting in a reactive rather than proactive approach to inclusion (UNICEF Albania, 2022).

(iii) Transition to the Labour Market for Graduates with Disabilities

The transition from higher education to the labour market is a critical time for graduates with disabilities, shaping their economic independence, social inclusion, and long-term well-being. Globally, this process is influenced by systemic, institutional, and individual factors, including the availability of targeted employment services, employer attitudes, workplace accessibility, and the strength of policy frameworks linking education and employment (ILO, 2008; OECD, 2009). In Albania, these challenges are compounded by gaps in institutional preparedness, limited employer awareness, and insufficient integration between higher education institutions and the labour market (UNDP, 2021).

Employment Barriers

Research consistently shows that graduates with disabilities experience higher unemployment rates, underemployment, and job mismatches compared to their non-disabled peers (OECD, 2021; Schur *et al.,* 2013). Barriers include employer bias and misconceptions about the cost and feasibility of accommodations (Bruyère *et al.,* 2005), limited workplace accessibility (Fry *et al.,* 2020), and a lack of targeted job placement and career counselling services (Lindsay *et al.,* 2015).

Effective employment transitions often depend on career services that are disability-inclusive, offering individualized guidance, accessible job postings, mentorship programs, and internship opportunities (Janković *et al.,* 2021; Madaus, 2006). However, studies in

both high and middle-income countries show that many higher education institutions fail to provide such tailored services, resulting in prolonged job searches and higher attrition from the labour force (García-González *et al.,* 2022).

In Albania, employer awareness and readiness to hire graduates with disabilities remain low (Sholla & Zisi, 2021). While the National Agency for Employment and Skills reported that 525 persons with disabilities were trained and employed in 2024, the data are not disaggregated by education level, obscuring the outcomes for university graduates (MSHMS, 2024). In addition, university career services rarely integrate disability-specific employability support, and coordination with employers to create accessible internships is sporadic (Giakoumis, 2021).

Vocational Training and Pathways

International evidence highlights the value of vocational education and training (VET) in facilitating labour market entry for persons with disabilities, particularly when programs are designed to meet both employer needs and the functional capacities of participants (Butterworth *et al.,* 2012; Leicht-Deobald *et al.,* 2022). Successful models incorporate workplace simulations, soft skills training, and structured partnerships between VET providers, higher education institutions, and employers (Lindsay *et al.,* 2018).

The World Bank (2021) and UNESCO (2020) emphasize that integrating VET with higher education pathways enhances flexibility and supports lifelong learning for persons with disabilities, enabling upward mobility in the labour market.

In Albania, participation of students with disabilities in vocational training remains exceptionally low, only 1.2% of VET enrolments in 2020–2021 (UNDP 2021). Curricula are not adapted to the needs of learners with disabilities, and practical placements are rare. Moreover, weak integration between VET and higher education systems means that graduates from vocational programs have limited pathways to further study and higher-skilled employment (Cungu & Sulçe, 2019; UNDP 2021).

Employer Engagement and Inclusive Hiring Practices

Employer engagement is essential to improving employment outcomes for graduates with disabilities. Evidence shows that sustained partnerships between universities and employers, combined with financial incentives and public awareness campaigns, can significantly increase recruitment rates (Buciuni & Pisano, 2018; Lindsay *et al.,* 2019). The adoption of inclusive recruitment practices, such as accessible job applications, alternative interview formats, and transparent accommodation policies, has been linked to higher retention rates for employees with disabilities (Shaw *et al.,* 2021).

In Albania, employer engagement in inclusive hiring remains underdeveloped. While some organization or private companies have participated in EU-funded disability employment projects, these initiatives are often short-term and lack scalability (Sholla & Zisi, 2021). Public sector employment for graduates with disabilities is also limited, despite quotas established in legislation (Law No. 15/2019 on Employment Promotion).

(iv) Economic and Social Inclusion of Graduates with Disabilities

Higher Education is a critical driver of economic empowerment and social participation for persons with disabilities. It contributes by enhancing human capital, expanding social networks, fostering civic engagement, and enabling participation in knowledge-based economies (OECD, 2021; WHO, 2011). Tertiary education increases employability, earnings potential, and career mobility, thereby reducing poverty and economic dependence (Becker, 1994; Psacharopoulos & Patrinos, 2018). For persons with disabilities, these benefits can be amplified: a university degree can mitigate some of the systemic discrimination in the labor market by signaling skills and competencies to employers (Baldwin & Johnson, 2006; Schur *et al.,* 2014).

Economic inclusion is realized when graduates with disabilities have equitable access to decent work, fair wages, and career advancement. Research shows that in high-income countries, tertiary education reduces the disability employment gap more than secondary or vocational training alone (Houtenville & Kalargyrou, 2012; Lindsay *et al.,* 2018). Furthermore, higher education is associated with reduced reliance on disability benefits and greater financial independence (Jones, 2008; Madaus *et al.,* 2010).

Social inclusion encompasses participation in community life, political engagement, cultural activities, and social networks. Higher Education fosters social capital through peer interaction, exposure to diverse perspectives, and participation in extracurricular activities (Trowler, 2010; Hall & Healey, 2005). For students with disabilities, accessible campus environments and inclusive pedagogies can facilitate the development of identity, leadership skills, strengthening their capacity to influence policy and practice in society (Moriña, 2017; Seale, 2014).

Despite the potential of higher education to promote inclusion, disparities persist in educational attainment, graduate outcomes, and post-study trajectories between students with and without disabilities. Students with disabilities are less likely to complete higher education programs, more likely to take longer to graduate, and more likely to study part-time due to accessibility barriers, health-related interruptions, or inadequate accommodations (Richardson, 2001; Fuller *et al.,* 2004; Lombardi *et al.,* 2011). After graduation, they face higher unemployment rates, are overrepresented in low-paying jobs, and are underrepresented in leadership roles (Schur *et al.,* 2014; Lindsay *et al.,* 2018). The employment gap is wider for women with disabilities and for those from minority ethnic or rural backgrounds, pointing to intersecting inequalities (Jones, 2008; OECD, 2021).

In Albania, higher education has the potential to empower persons with disabilities economically and socially, but systemic and institutional gaps undermine this potential (Sholla & Zisi, 2021). Accessibility issues in HEIs, insufficient provision of assistive technologies, and a lack of inclusive career services limit the effectiveness of higher education as a pathway to labour market participation (UNICEF Albania, 2022).

While the Law No. 15/2019 on Employment Promotion includes measures to encourage hiring persons with disabilities, enforcement is inconsistent, and higher education graduates are not a specific focus of these policies. This disconnect between education and employment policy results in underutilization of the skills and qualifications of graduates with disabilities.

In Albania, disparities are reinforced by limited job opportunities for graduates with disabilities, weak employer engagement, and the lack of integrated data systems to track employment outcomes (Cungu & Sulçe, 2019; Giakoumis, 2021). Poverty rates remain high: 96% of families with children with disabilities live in low-income conditions (Voko, et.al., 2018), reflecting structural exclusion throughout the life course. NGO-led initiatives have piloted mentorship and employment programs for graduates with disabilities, but these remain small-scale and dependent on external funding (Sholla & Zisi, 2021). Without national-level, sustained programs linking higher education institutions, employers, and government agencies, the economic and social inclusion potential of higher education for persons with disabilities will remain unrealized.

POLICY AND SERVICE PROVISION IMPLICATIONS

The analysis identifies priorities that require further studies but also coordinated intervention by policymakers, higher education institutions, and relevant state agencies to address systemic barriers, expand equitable participation, and strengthen institutional capacity for disability inclusion in higher education.

The findings highlight key priorities for policy and service provision:

- *Specialized support for dominant disability types:* The prevalence of blindness necessitates investment in assistive technologies, tactile resources, and trained personnel.
- *Decentralization of services:* The concentration of students with disabilities in Tirana and Shkodër underscores the need to equip regional universities with basic accessibility infrastructure and training.
- *Field diversification:* Targeted interventions, such as adapted laboratory equipment and curricular adjustments, are essential for inclusion in STEM, health sciences, and technical fields.
- *Institutional capacity building:* Reliance on a few "accessibility islands" risks deepening inequality; minimum accessibility standards should be implemented across all higher educational institutions.
- *Pathways for underrepresented groups:* The minimal participation of students with intellectual and dual sensory disabilities calls for outreach, preparatory programmes, and inclusive admission policies
- *Networking with employment institutions and business:* Sustained programs linking higher education institutions, employers, and government agencies in order to realize the economic and social inclusion potential of higher education for persons with disabilities.
- *Accessibility and Reasonable Accommodation:* Higher education institution should prepare, adopt, implement operational procedures to realize accessibility in environment, information, communication and transport and reasonable individual adaptation based on the needs of students with disabilities. (viii). Capacity Building: Disability rights training for teaching, administrative staff and students; disability units within higher education institutions with trained responsible staff. (ix) Biopsychosocial evaluation: Building the procedures for evaluation of students with disabilities based on ICF recommendations.

ETHICAL CONSIDERATIONS

This study was conducted in accordance with established ethical standards for research in higher education and the social sciences. Confidentiality and anonymity were strictly maintained: no identifying information was collected, and data were reported only in aggregate form to prevent attribution to individuals or institutions. Access to raw data was restricted to the authors, ensuring compliance with the principles of integrity, autonomy, and data protection under the General Data Protection Regulation (GDPR, Regulation (EU) 2016/679).

REFERENCES

British Educational Research Association. (2018). *Ethical guidelines for educational research* (4th ed.). BERA.

Becker, G. S. (1994). *Human capital: A theoretical and empirical analysis, with special reference to education* (3rd ed.). University of Chicago Press.

Bruyère, S., Erickson, W., & VanLooy, S. (2005). Comparative study of workplace policy and practices contributing to disability nondiscrimination. *Rehabilitation Psychology, 50*(1), 28–38. https://doi.org/10.1037/0090-5550.50.1.28

Buciuni, G., & Pisano, G. P. (2018). Networked incubators: Hubs of entrepreneurship in the field of inclusive employment. *Harvard Business Review, 96*(2), 80–89.

Butterworth, J., Smith, F. A., Hall, A. C., Migliore, A., Winsor, J., Timmons, J., & Domin, D. (2012). StateData: The national report on employment services and outcomes. *Institute for Community Inclusion*.

Burgstahler, S. (2015). *Universal Design in Higher Education: From Principles to Practice* (2nd ed.). Harvard Education Press.

Bickenbach, J.,Posarac, A.,Cieza, A.,Kostanjsek, N. (2015. Assessing Disability in Working Age Population: A Paradigm Shift from Impairment and Functional Limitation to the Disability Approach. DOI:10.1596/22353.

Cook, L., Rumrill, P., & Tankersley, M. (2009). Priorities and understanding of faculty members regarding college students with disabilities. *International Journal of Teaching and Learning in Higher Education, 21*(1), 84–96.

Cole, E. V., & Cawthon, S. W. (2015). Self-disclosure decisions of university students with learning disabilities. *Journal of Postsecondary Education and Disability*, *28*(2), 163–179. https://www.ahead.org/professional-resources/publications/jped

Cungu, A., & Sulçe, A. (2019). *Përmirësimi i Statistikave për Personat me Aftësi të Kufizuara në Shqipëri.* INSTAT & UNDP Albania.

Collins, M. E., & Mowbray, C. T. (2005). Higher education and psychiatric disabilities: National survey of campus disability services. *American Journal of Orthopsychiatry, 75*(2), 304–315. https://doi.org/10.1037/0002-9432.75.2.304

Clouder, L., Adefila, A., Jackson, C., Opie, J., & Odedra, S. (2016). The discourse of disability in higher education: Insights from a health and social care perspective. *International Journal of Educational Research, 79*, 10–20. https://doi.org/10.1016/j.ijer.2016.05.015

Denhart, H. (2008). Deconstructing barriers: Perceptions of students labeled with learning disabilities in higher education. *Journal of Learning Disabilities, 41*(6), 483–497. https://doi.org/10.1177/0022219408321151

Fichten, C. S., Jorgensen, M., Havel, A., & Barile, M. (2014). Accessibility of e-learning and information and communication technologies for post-secondary students with disabilities. *Journal of Postsecondary Education and Disability, 27*(3), 261–273.

Fry, L., McGuire, D., & Shaw, S. (2020). The barriers to workplace inclusion: Insights from the perspective of employees with disabilities. *Equality, Diversity and Inclusion, 39*(2), 137–150. https://doi.org/10.1108/EDI-03-2019-0070

Fuller, M., Healey, M., Bradley, A., & Hall, T. (2004). Barriers to learning: A systematic study of the experience of disabled students in one university. *Studies in Higher Education, 29*(3), 303–318. https://doi.org/10.1080/0307507041000168259 2

Garcia-Gonzalez, A., Fores, A., & Sancho-Vinuesa, T. (2022). Employment and disability: The influence of inclusive policies and practices. *International Journal of Disability, Development and Education*, 69 (5), 1440-1458.

Gernsbacher, M. A. (2015). Video captions benefit everyone. *Policy Insights from the Behavioral and Brain Sciences, 2*(1), 195–202. https://doi.org/10.1177/2372732215602130

Getzel, E. E. (2008). Addressing the persistence and retention of students with disabilities in higher education. *Exceptionality, 16*(4), 207–219. https://doi.org/10.1080/09362830802412216

Giakoumis, K. (2021). *Analysis & master-plan to address the needs & wants of accessible higher education in the Western Balkans.*

Hong, B. S., Haefner, L. S., & Slekar, T. D. (2018). Faculty attitudes toward students with disabilities in higher education: A literature review. *College Quarterly, 21*(1), 1–16.

Hall, T., & Healey, M. (2005). Disabled students' experiences of fieldwork. *Area, 37*(4), 446–449. https://doi.org/10.1111/j.1475-4762.2005.00648.x

Houtenville, A. J., & Kalargyrou, V. (2012). People with disabilities: Employers' perspectives on recruitment practices, strategies, and challenges in leisure and hospitality. *Cornell Hospitality Quarterly, 53*(1), 40–52. https://doi.org/10.1177/1938965511424151

ILO (2008). Achieving equal employment opportunities for people with disabilities through legislation: An education and training guide / International Labour Office. - Geneva: ILO, 2011 ca p. 173 ISBN: 978-92-2-120141-0 (print); 978-92-2-120142-7 (CD-ROM); 978-92-2-120143-4 (web pdf)

Janković, J., Milinković, D., & Popović, M. (2021). Inclusive career guidance in higher education: Practices from the Western Balkans. *European Journal of Education, 56*(2), 285–303. https://doi.org/10.1111/ejed.12435

Jones, M. K. (2008). Disability and the labour market: A review of the empirical evidence. *Journal of Economic Studies, 35*(5), 405–424. https://doi.org/10.1108/01443580810903554

Kent, M., Ellis, K., & Giles, M. (2018). Students with disabilities and eLearning in Australia: Experiences of accessibility and disclosure. *TechTrends, 62*(6), 654–663. https://doi.org/10.1007/s11528-018-0337-y

Leicht-Deobald, U., Busch, T., Schank, C., Weibel, A., Schafheitle, S., Wildhaber, I., & Kasper, G. (2022). The challenges of employment for persons with disabilities: A systematic review. *Human Resource Management Review, 32*(1), 100828. https://doi.org/10.1016/j.hrmr.2019.100828

Lindsay, S., Cagliostro, E., Albarico, M., Mortaji, N., & Karon, L. (2015). A systematic review of the benefits of hiring people with disabilities. *Journal of Occupational Rehabilitation, 25*(2), 193–223. https://doi.org/10.1007/s10926-014-9514-6

Lindsay, S., McPherson, A. C., Aslam, H., McKeever, P., & Mortaji, N. (2018). Career development services for youth with disabilities: A systematic review. *Journal of Occupational Rehabilitation, 28*(1), 40–55. https://doi.org/10.1007/s10926-017-9709-7

Lindsay, S., Meisner, B., & Gignac, M. (2019). Gender and disability: Intersectionality and workplace outcomes. *Equality, Diversity and Inclusion: An International Journal, 38*(7), 752–767. https://doi.org/10.1108/EDI-08-2018-0146

Lombardi, A., Murray, C., & Gerdes, H. (2011). College faculty and inclusive instruction: Self-reported attitudes and actions pertaining to students with disabilities. *Journal of Postsecondary Education and Disability, 24*(1), 17–30.

Linder, K. E. (2016). Student uses and perceptions of closed captions and transcripts. *Journal of Applied Research in Higher Education, 8*(3), 345–361. https://doi.org/10.1108/JARHE-04-2015-0025

Lucas, K. (2012). Transport and social exclusion: Where are we now? *Transport Policy, 20*, 105–113. https://doi.org/10.1016/j.tranpol.2012.01.013

Ministry of Health and Social Protection [MSHMS]. (2024). *Raporti Vjetor i Formimit Profesional.*

Madaus, J. W. (2006). Employment self-disclosure rates and rationales of university graduates with learning disabilities. *Journal of Learning Disabilities, 39*(3), 212–225. https://doi.org/10.1177/00222194060390030201

Moriña, A. (2017). Inclusive education in higher education: A model of change. *Journal of Research in Special Educational Needs, 17*(1), 68–76. https://doi.org/10.1111/1471-3802.12099

Madriaga, M. (2010). Disabled students in higher education: Discourses of disability and the negotiation of identity. *International Journal of Educational Research, 49*(4–5), 272–282. https://doi.org/10.1016/j.ijer.2011.12.008

Moriña, A., & Morgado, B. (2018). University surroundings and infrastructures that are accessible and inclusive for all students. *Journal of Further and Higher Education, 42*(1), 13–23. https://doi.org/10.1080/0309877X.2016.1188900

OECD. (2021). *Disability, work and inclusion: Mainstreaming in all policies and practices*. OECD Publishing. https://doi.org/10.1787/2f607f92-en

OECD (2011), Inclusion of Students with Disabilities in Tertiary Education and Employment, Education and Training Policy, OECD Publishing. http://dx.doi.org/10.1787/9789264097650-en

O'Shea, A., & Meyer, R. H. (2016). A Qualitative Investigation of the Motivation of College Students with Nonvisible Disabilities to Utilize Disability Services. *Journal of Postsecondary Education and Disability*, 29(1), 5-23.

Oliver, M. (1996). *Understanding disability: From theory to practice*. St Martin›s Press. https://doi.org/10.1007/978-1-349-24269-6

Pineda, V. S., & Corburn, J. (2020). Disability, urban health equity, and the coronavirus pandemic. *Cities & Health, 4*(1), 1–5. (Mobility/accessibility insights). https://doi.org/10.1080/23748834.2020.1785163

Psacharopoulos, G., & Patrinos, H. A. (2018). Returns to investment in education: A decennial review of the global literature. *Education Economics, 26*(5), 445–458. https://doi.org/10.1080/09645292.2018.1484426

Quinn, G. (2013). *Personhood & legal capacity: Perspectives on the paradigm shift of article 12 CRPD*. HPOD Harvard Law School.

Rao, K., Edelen-Smith, P., & Wailehua, C.-U. (2014). Universal design for learning and digital text in inclusive classrooms. *Journal of Special Education Technology, 29*(1), 25–38. https://doi.org/10.1177/016264341402900103

Rose, D. H., Harbour, W. S., Johnston, C. S., Daley, S. G., & Abarbanell, L. (2006). Universal design for learning in postsecondary education. *Journal of Postsecondary Education and Disability, 19*(2), 135–151.

Richardson, J. T. E. (2001). The representation and attainment of students with a hearing loss in higher education. *Studies in Higher Education, 26*(2), 183–204. https://doi.org/10.1080/03075070120052015

Schur, L., Kruse, D., & Blanck, P. (2013). *People with Disabilities: Sidelined or Mainstreamed?* Cambridge University Press.

Shaw, S., McGuire, D., & Fry, L. (2021). Developing inclusive talent pipelines: Employer perspectives on recruiting and retaining employees with disabilities. *Human Resource Management Journal, 31*(3), 678–694. https://doi.org/10.1111/1748-8583.12314

Sholla, A., & Zisi, A. (2021). Employment barriers for graduates with disabilities in Albania. *Journal of Social Policy Studies, 24*(2), 115–132.

Seale, J., Georgeson, J., Mamas, C., & Swain, J. (2015). Not the right kind of "digital capital"? *Computers & Education, 82*, 118–128. https://doi.org/10.1016/j.compedu.2014.11.007

Shogren, K. A., Wehmeyer, M. L., Palmer, S. B., Rifenbark, G. G., & Little, T. D. (2015). Self-determination and postschool outcomes. *The Journal of Special Education, 48*(4), 256–267. https://doi.org/10.1177/0022466913489733

Steinfeld, E., & Maisel, J. (2012). *Universal design: Creating inclusive environments*. Wiley.

Strnadová, I., Hájková, V., & Květoňová, L. (2015). Voices of university students with disabilities: Inclusive education on the tertiary level – a reality or a distant dream? *International Journal of Inclusive Education, 19*(10), 1080–1095. https://doi.org/10.1080/13603116.2015.1037868

Sniatecki, J. L., Perry, H. B., & Snell, L. H. (2015). Faculty attitudes and knowledge regarding college students with disabilities. *Journal of Postsecondary Education and Disability, 28*(3), 259–275.

Sulaj, A.et.al. (2021). Assessment of accessibility of disabled students in Albanian HEI infrastructure. *Journal of Educational and Social Research, 11*(3), 215–225. https://doi.org/10.36941/jesr-2021-0062

Shakespare, T. (2013). Disability Rights and Wrongs Revisited. Routledge, London.

Schein, E.H. (2010). Organizational Culture and Leadership (4th.ed.) San Francisco, CA.

Svendby, R. B. (2024). Inclusive teaching in higher education: Challenges of diversity in learning situations from the lecturer perspective. *Social Sciences, 13*(3), 140. https://doi.org/10.3390/socsci13030140

Subu, et.al. (2025**).** Experiences of students with disabilities enrolling in higher education: A qualitative study in the United Arab Emirates. *F1000Research, 14*, 14. https://doi.org/10.12688/f1000research.158481.1

SeBashku Foundation (2024). Alternative Report on Implementation of UNCRPD in Albania.

Toto, E., & Domi, A. (2023). Assessment of accessibility of disabled students in the public university infrastructure in Albania. *European Journal of Education and Pedagogy, 4*(5), 36–42. https://doi.org/10.24018/ejedu.2023.4.5.637

UNESCO. (2020). *Global Education Monitoring Report 2020: Inclusion and Education*. UNESCO Publishing.

UNICEF Albania. (2018). We all Matter! Situation Analyses for Children with Disabilities in Albania.

UNDP. (2015). *The social exclusion profile of persons with disabilities in Albania.* UNDP

United Nations. (2006). Convention on the Rights of Persons with Disabilities.

UNDP (2021). Inclusive Vocational Rehabilitation and Training for People with Disabilities in Albania. UNDP.

UNDESA (2024). Disability and Development Report 2024 – Accelerating the realization of the Sustainable Development Goals by, for and with persons with disabilities. https://social.desa.un.org

World Bank. (2021). *Disability Inclusion and Accountability Framework*.

Voko, K., Kulla, F., & Flagler, C. (2018). *Persons with Disabilities in Albania: Statistics and Analysis*. INSTAT & UNDP Albania.

Velho, R., Holloway, C., Symonds, A., & Balmer, B. (2016). The effect of transport accessibility on the social inclusion of wheelchair users. *Journal of Transport & Health, 3*(2), 111–122. https://doi.org/10.1016/j.jth.2016.02.004

World Health Organization. (2011). *World report on disability*. WHO Press.

Trowler, V. (2010). Student engagement literature review. *The Higher Education Academy*.

Tierney, W.G.(1988).Organizational Culture in Higher Education: Defining the Essentials.The Journal of Higher Education, 59,2-21.http://dx.doi.org/10.2307/1981868

Yenduri, S., Nair, S., & Subramaniam, P. (2023). Universal design in higher education: Bridging the gap for students with disabilities. *International Journal of Inclusive Education, 27*(4), 421–440. https://doi.org/10.1080/13603116.2021.1918464

Zenelaga, B. (2024). Inclusive universities: Exploring the wellbeing of university students with special needs in Albania. *Journal of Education Culture and Society, 2*, 373–388. jecs.pl

THE DIGITAL EMPLOYMENT GAP IN ALBANIA

Challenges and Strategies for Higher Education

Gertjana **HASALLA**

Labour Expert, Centre for Labour Rights (CLR)
gertjanahasalla@gmail.com

Abstract

Albania faces a growing digital employment gap, marked by a mismatch between the skills required by the labour market and those provided by higher education. National initiatives such as e-Albania 2.0, GovTech Accelerator, SmartLabs, and DIGJIKOMP-AL have advanced digitalization, yet graduates often lack the applied competences expected in diverse sectors. This paper examines national strategies and institutional projects, including AKSHI–University partnerships, to assess current progress and persistent shortcomings. The research draws on policy reviews, institutional agreements, labour market surveys, and sectoral reports. Findings reveal limited integration of field-specific digital skills across curricula, regional and socioeconomic disparities in access to infrastructure, and insufficient industry–university collaboration. The study argues that systemic reform is required, moving from isolated ICT courses toward embedded digital competences in all disciplines, supported by professional development for faculty and targeted inclusion policies. Five recommendations are proposed: integrate digital learning outcomes across all programmes, expand faculty training in digital pedagogy, strengthen university–industry partnerships, address digital exclusion for underserved students, and establish continuous monitoring aligned with EU DigComp standards. Coordinated action between the Ministry of Education, AKSHI, universities, and the private sector, supported by EU cooperation, is essential to prepare graduates for a rapidly evolving digital economy.

Keywords: digital employment gap, higher education, Albania, digital inclusion, curriculum reform, labour market, digital skills

ABOUT THE AUTHOR

GERTJANA HASALLA

Gertjana Hasalla holds a Master of Science in Translation and Interpreting Studies and a Bachelor's in English Language and Literature, and she is currently pursuing a second Master's in Team Management & Leadership. With more than ten years of professional experience, she has built a strong career in program management, policy development and advocacy within the non-profit sector. She is Program Manager at the Centre for Labor Rights, where she leads program strategy, research and donor reporting, and has contributed to key publications on labor trends and social rights. In addition, she works as Policy and Project Expert at the Albanian Center for Population and Development, authoring strategic documents and proposals that support institutional development. Previously, she also coordinated multi-year projects on gender equality and community development with the Woman Forum Elbasan, while also teaching English for Specific Purposes at the University "Aleksander Xhuvani" of Elbasan. Internationally, Gertjana has participated in the U.S. State Department's Professional Fellows Program and the International Visitor Leadership Program. She has authored and co-authored several publications on migration governance, social rights, labor issues and gender budgeting, combining academic expertise with practical experience to advance equality and social justice.

INTRODUCTION AND AIMS OF THE STUDY

This study investigates the role of higher education in addressing Albania's digital employment gap. Its purpose is to explore how universities can align curricula with labour market needs, integrate digital competences across disciplines and reduce disparities in access. The research is designed to contribute both to national policy debates and international scholarship on digital transformation in education. Specifically, it aims to answer three questions:

- How are national strategies addressing digital competences in higher education?
- What structural and institutional barriers persist in aligning higher education with labour market requirements?
- What reforms are necessary to reduce the digital employment gap?

This research draws on the EU DigComp 2.2 framework (Carretero *et al.,* 2022), which identifies five dimensions of digital competence: information literacy, communication, content creation, safety and problem solving. The study also incorporates theories of digital inclusion and higher education reform, particularly those that emphasise the embedding of digital skills across disciplines rather than treating them as stand-alone ICT modules. The conceptual framework combines these theories with labour market alignment approaches that stress university–industry cooperation as a foundation for employability.

METHODOLOGY

The paper adopts a qualitative research design based on document analysis. Data were collected from policy reports, national strategies, EU frameworks, institutional agreements and labour market surveys. The selection of sources reflects both government and independent perspectives to ensure triangulation. Reliability was strengthened by cross-referencing findings with multiple reports from different institutions, while validity was ensured by grounding the analysis in the DigComp framework. The methodological approach is policy-driven but supported by conceptual models of digital competence and higher education transformation.

ETHICAL CONSIDERATIONS

Although the study relies on secondary data, ethical considerations remain relevant. Potential bias in official policy documents, unequal representation of vulnerable groups and limitations of survey coverage are acknowledged. By highlighting these issues, the research aims to ensure responsible interpretation and to promote policies that address digital exclusion among disadvantaged populations.

CONTEXT: DIGITAL TRANSFORMATION IN ALBANIA & LABOUR MARKET SHIFTS

Albania is undergoing a rapid digital transformation driven by public initiatives that aim to modernize public administration and the private sector in response to shifting employment needs. Among these, e-Albania 2.0 and the Digital Agenda 2022–2026 are central projects

shaping this transformation (University of Tirana, 2022). The Digital Agenda 2022–2026, prepared by the National Agency for Information Society, serves as a strategic roadmap for Albania's transition to a digital society. It builds on earlier achievements, with the e-Albania platform now providing more than 95 percent of public services online, reducing bureaucracy, increasing transparency and streamlining administrative processes (AKSHI, 2023; DigWatch, 2022). The updated agenda outlines a vision for fully digitalized governance, enabling citizens and businesses to access services through integrated platforms supported by technologies such as artificial intelligence and block chain (DigWatch, 2022). E-Albania 2.0 is being designed around life-event–based services such as job seeking, retirement, and business registration, incorporating user-friendly interfaces, voice assistants, and accessibility enhancements (Monitor, 2024; University of Tirana, 2024).

The World Bank's GovTech for Results programme, launched in 2023, has strengthened the reach of e-Albania 2.0 and set higher standards for inclusion. It reports a 40 percent increase in service applications via the platform and estimates that by 2029 nearly three million users will benefit from faster services and enhanced infrastructure (World Bank, 2025). In education, 216 SmartLabs have been established in primary schools, improving ICT access for approximately 35 000 students and providing training for more than 1 000 teachers and school leaders (World Bank, 2025). Additionally, vocational and innovation centres are being developed to equip young people with skills aligned with the evolving labour market (Ministry of State for Entrepreneurship and Business Climate, 2024).

The government has also invested significantly in the innovation ecosystem. The Smart Specialisation Strategy is supported by nearly €1.18 billion, with €14.5 million allocated for startups and SMEs, and more than €7 million granted over the past two years to strengthen innovative enterprises (Ministry of State for Entrepreneurship and Business Climate, 2024). Partnerships between the Albanian Cybernetics Association and Italian NGO NAMEX have strengthened the country's internet infrastructure through the ANIX Internet Exchange Point, reducing access costs and improving connectivity (Balkan Insight, 2023).

Despite these improvements, gaps remain. Around 14 % of Albanians still lack internet access, particularly in rural and disadvantaged areas. Only about 4 % of the population possesses advanced digital skills, placing Albania behind other Western Balkan countries (Balkan Insight, 2023; DigWatch, 2022). Private sector demand for digital competences is rising quickly. Sectors such as banking, tourism, telecommunications, architecture, and media now require workers with expertise in cloud computing, data analysis, and sector-specific software, as well as the ability to adapt to technology-driven work environments (INSTAT, 2024; Ministry of Finance and Economy, 2022). The Employment and Skills Strategy 2022–2030 identifies persistent gaps between formal education and the practical skills employers require. It calls for integrating digital competences at all levels of education and aligning curricula more closely with labour market needs (Ministry of Finance and Economy, 2022). Surveys conducted by the European Training Foundation confirm that many Albanian graduates lack basic digital skills, including cloud technologies, data processing, and professional online communication, which limits their competitiveness in

digitized sectors (ETF, 2023). The Digital Agriculture and Rural Transformation (DART) program, launched in 2024 by the United Nations in collaboration with FAO, ILO, and ITU, aims to modernize rural services and agricultural practices. The initiative focuses on developing a national digital agriculture strategy aligned with EU standards, enhancing the Farmers' Portal, and providing training to farmers, students in technical schools, and public officials (United Nations Albania, 2024).

Overall, Albania's digital transformation is reshaping both the public and private sectors. Governance is moving toward fully integrated digital services, education is being updated with modern technology, the economy is supported through innovation hubs, and rural sectors are being connected through specialized programs. However, infrastructure limitations, skills gaps, and regional disparities remain significant challenges. For higher education, this means a pressing need to embed digital competences across curricula, strengthen partnerships with industry, and ensure equitable access to learning opportunities for all students.

HIGHER EDUCATION'S CURRENT CAPACITY TO ADDRESS DIGITAL NEEDS

Albanian universities have made notable advances in embracing digital education, particularly as a direct response to the COVID-19 pandemic. Many public institutions integrated Learning Management Systems and digital assessment tools into their workflows; these changes helped sustain teaching and learning. Nonetheless, efforts remain inconsistent and often limited to individual projects rather than system-wide transformation (Gugu & Kristo, 2023; MDPI, 2021). The abrupt shift to online learning during the pandemic exposed significant variability in readiness among universities. A survey conducted in early 2021 revealed that many institutions lacked strategic planning and infrastructure to support remote teaching. Faculty resorted to independent solutions, creating e-materials with minimal guidance; platforms such as Zoom and Google Classroom were adopted rapidly, sometimes without formal training or institutional backing (MDPI, 2021). These stop-gap measures enabled continuity in instruction, yet underscored the fragility of digital capabilities in higher education. A study examining lecturer and student experiences in the humanities at the University of Elbasan and the University of Tirana found that prior digital skills were generally inadequate; the traumatic shift catalysed skill development, but this occurred largely through self-directed learning rather than formal support. Despite progress, students' digital capabilities did not show substantial improvement beyond basic tool usage (Gugu & Kristo, 2023).

In 2021, AKSHI and the Ministry of Education launched the DIGJIKOMP-AL project to assess digital competences among academic staff in public higher education institutions (University of Tirana, 2022). Pilot self-assessments revealed uneven digital proficiency among faculty; some demonstrated adequate competencies, while others lacked training in digital pedagogy and emerging technologies. The project aimed to increase capacities to support quality teaching and learning; however, outcomes have not yet translated into scaled faculty development or widespread curriculum integration (University of Tirana, 2022).

Curriculum reform efforts emerged under the U2SID Erasmus+ project, aimed at embedding digital learning outcomes across higher education programmes. Universities including the University of Tirana, Polytechnic University of Tirana and University of Elbasan participated in workshops organized under the U2SID Digital Literacies Accelerator Program, which focuses on developing digital competences through collaborative and inclusive strategies (QSKN, 2023). A workshop held at the Mediterranean University of Albania in March 2024 emphasized integrating digital literacy across programmes, facilitating engagement between faculty, students and industry professionals, and modernizing study design (QSKN, 2024). These initiatives proposed integrating digital literacies across disciplines, enhancing teaching methods, and aligning programs with labour market needs. Yet, implementation remains limited to pilot activities, and many programmes still treat digital skills as isolated ICT modules rather than embedding them throughout curricula.

Some private universities made early strides in digital course offerings. Institutions such as Epoka University and Metropolital University of Tirana, UMT introduced digitally oriented courses, leveraging their autonomy to innovate curricula. Epoka University offers programs in Computer Engineering, Business Administration and Architecture, where digital tools are naturally embedded (Epoka, 2025). These universities tend to operate with more agility and may incorporate digital components more readily; however, coordination with national standards and public sector reforms remains limited. Other universities developed in-house digital systems to manage academic workflows and support online teaching. For example, at the University of Shkodra "Luigj Gurakuqi", the SMAK platform manages pedagogical loads and communications, while a Moodle-based system supports course delivery. This institution also launched a Continuing Education Training Laboratory to build lecturer skills in digital tools and online course design ((Demaj *et al.,* 2020). University of Elbasan deployed Moodle for specific departments, initially offering online teaching in social sciences with as many as 200 students participating. The university's Educational Management System supports administrative functions, while the E-Learning platform is still limited to partial adoption. Only a negligible fraction of courses was designed as blended learning, and most remain entirely face-to-face (Ibid).

Despite these efforts, several challenges remain. A lack of coherent strategy means many *initiatives are project-based, time-limited and not institutionalized.* The breadth of digital integration varies widely across universities and per faculty. Most programmes still treat digital education as optional modules rather than intrinsic to all disciplines. Faculty development remains uneven; while some institutions invested in training and mentoring, many rely on self-learning and peer sharing. Students may develop familiarity with basic tools, but deeper digital skills such as data literacy, digital content creation or pedagogical technology integration remain uncommon. Moreover, private university innovations are rarely synchronized with national priorities. Public universities often lack the agility to implement reforms comprehensively, while private institutions may fail to contribute to public digital education transformation.

The pandemic highlighted the necessity of resilient digital infrastructure and digital

pedagogy. The DIGJIKOMP-AL and U2SID initiatives offer valuable inroads into institutionalizing digital competences, yet without system-wide adoption, their impact remains limited. Embedding digital skills across curricula requires professional development for academic staff, not just one-off trainings, but ongoing support for digital pedagogy in all disciplines. University governance structures should ensure digital literacies are integral to programmes objectives rather than add-on modules. Collaboration among public and private universities, alignment with national digital agendas and coordination with quality assurance mechanisms like ASCAL can help foster consistency. Shared platforms, resource centers and faculty networks may enable scaling of good practice.

Albanian universities responded to the pandemic by adopting digital tools and platforms under pressure. While progress was achieved in some areas, digital education remains fragmented. Pilot programmes such as DIGJIKOMP-AL and U2SID offer practical frameworks for embedding digital literacies, yet need scaling and integration with institutional mandates. Private universities provide examples of innovation, though alignment with broader educational transformation is weak.

For sustainable change, higher education institutions must move from reactive digital adoption towards strategic integration. This means equipping faculty in digital pedagogy, redesigning curricula to include digital competences across all programmes, and aligning efforts across public and private sectors. The digital transformation of university education will remain nascent until challenges of coordination, capacity and policy are addressed.

THE MISSING LINK: ALIGNING UNIVERSITIES WITH THE LABOR MARKET

Despite growing recognition of the digital employment gap, structural misalignments persist. Employers report that graduates are not adequately prepared for real-world digital tasks, especially in fields like engineering, health sciences, public administration, journalism (RisiAlbania, 2024) and education (Nathanaili, 2023). For instance, engineering students may receive strong theoretical training but minimal exposure to simulation software or data platforms widely used in the industry. A critical reason for this gap is the limited communication between universities and employers. Career offices, where available, tend to focus on traditional placement services such as job listings rather than developing active, skills-based partnerships with businesses (RisiAlbania, n.d.). These services seldom engage in joint curriculum design, workplace retraining modules or shared internships aligned with digital competencies.

There are promising but fragmented efforts to bridge this gap. In 2023, the National Agency for Information Society (AKSHI) entered an agreement with the University of Tirana aimed at involving students in digital public service development (AKSHI, 2023). This initiative created opportunities for students to work on real digital platforms, which could help them understand practical public-sector needs. However, such collaborations are rare and system-wide frameworks to scale them across universities do not yet exist. Another major issue is the absence of system-wide monitoring mechanisms that ensure academic

content stays aligned with labour market trends. There is no mandatory requirement for universities to benchmark their curricula against established EU digital competence frameworks such as DigComp 2.2 (Carretero *et al.,* 2022). Without these benchmarks, academic programmes may fall behind rapidly evolving professional expectations. Moreover, comprehensive data on graduate employability, especially concerning digital readiness, remains limited. Universities do not routinely track employment outcomes by field or digital competence levels. Without reliable statistics, policymakers and institutions lack evidence needed for targeted and effective reform.

Some progress has been made through projects like RisiAlbania, supported by the Swiss Agency for Development and Cooperation and implemented by Helvetas and Partners Albania (RisiAlbania, n.d.-a). This project works to improve career guidance and job intermediation services, especially in sectors such as ICT. It helps to establish Skills Sectoral Committees that bring together businesses, educational institutions, and policymakers to reflect changing professional skills needs (RisiAlbania, n.d.-a). Such committees could serve as future platforms for university-industry collaboration if expanded. Despite this, RisiAlbania's initiatives are somewhat external to university systems and do not fully embed digital competency alignment into academic governance. Their work is impactful, yet not integrated into mainstream university processes.

The misalignment between university curricula and employer needs has tangible consequences. Graduates frequently require additional on-the-job training to become productive, increasing hiring costs and delaying full performance. In sectors like journalism and public administration, this means students may graduate with outdated skills that do not match current digital workflows or platforms. This misalignment also contributes to brain drain. Young professionals, finding limited opportunities in local markets, often emigrate to countries where their digital skills are more valued or better matched. This exacerbates the challenge for both universities and the economy (RisiAlbania, n.d.-a).

To close this gap, several actions are essential:

- Establish formal benchmarking frameworks that require universities to map their programmes against EU digital competence frameworks like DigComp 2.2. This would ensure curricula evolve with industry needs (Carretero *et al.,* 2022).
- Institutionalize collaboration between universities and businesses through internships, pilot projects and joint course design. Platforms similar to RisiAlbania's sectoral committees could be embedded in academic governance to guide program development.
- Empower career centers to go beyond placement services by organizing industry-led digital skilling events, fostering alumni mentorships and co-designing assessments aligned with workplace requirements.
- Gather and publish graduate data on employment outcomes, digital readiness, and field-specific performance. Robust data would inform curriculum reform and signal where education risks falling behind market needs.
- Scale AKSHI-university partnerships like the one with the University of Tirana by replicating digital public service co-development projects across disciplines and campuses.

REGIONAL & SOCIO-ECONOMIC BARRIERS TO DIGITAL INCLUSION

Digital exclusion remains a defining barrier for many Albanian students. Those from rural areas and low-income households face a combination of poor broadband access, limited exposure to digital tools in earlier education, and minimal support for acquiring advanced skills. Even though pre-university digital education programs such as SmartLabs have reached numerous schools, the divide in tertiary institutions is both glaring and persistent (UNICEF Albania, 2023). Students in rural areas often endure unstable or limited Internet connectivity. While mobile coverage may exist, fixed-line broadband is scarce and costly. In 2022, only about 9 % of rural residents had fixed-line connections, compared to 31 % in urban areas (AKEP, 2024). This disparity means that students outside major cities frequently lack reliable access to online learning platforms or digital resources.

Infrastructure gaps persist despite national efforts. The National Plan for Sustainable Digital Infrastructure (2020–2025) targeted universal broadband and improved connectivity for schools and institutions by 2025. Yet implementation in rural parts has lagged due to funding gaps, regulatory complexity, and a focus on profitable urban regions (DigWatch, 2020). Without broadband at home or institution, rural students face barriers in participating in digital learning or demonstrating digital competence.

Efforts such as SmartLabs and the Albania Digital Education Project focus on equipping primary and secondary schools with ICT infrastructure and teachers with digital pedagogy training. The initiative aimed to establish over 600 SmartLabs benefiting roughly 150,000 students, particularly in remote areas (UNESCO, 2021). Yet the impact in secondary and tertiary education remains limited, and inequalities continue to influence digital skill acquisition. In many rural schools, infrastructure and connectivity are still lacking. In one remote village, only 46 percent of schools (primary and secondary) had any Internet access and a mere 5.3 percent had Wi-Fi (BIRN, 2025). Teachers struggle to conduct even basic digital lessons, often relying on personal devices. These disparities in foundational digital exposure feed into higher education, where students from such backgrounds may enter under-prepared.

Public universities in peripheral regions consistently have weaker digital infrastructure compared to their peers in Tirana. Students and faculty in these universities face challenges accessing reliable Wi-Fi, up-to-date laboratory equipment, and modern educational platforms. These gaps limit both teaching quality and students' ability to develop advanced digital skills. Moreover, faculty at under-resourced universities often lack access to training in digital pedagogy or emerging technologies. Without structured internal capacity building, lecturers continue to teach using traditional methods, maintaining the digital gap across student cohorts.

Graduates from under-resourced universities face direct consequences in the job market. They are less likely to be considered for roles in digitalized sectors such as IT, finance, media or public administration, where digital fluency and familiarity with platforms are essential. Competing against peers from better-equipped institutions, these graduates often experience

lower employability and increased vulnerability to unemployment or underemployment. Disparities in digital readiness also perpetuate socioeconomic inequalities. Students from rural or low-income backgrounds frequently have fewer opportunities to access internships, industry alignments, or networking events that could offset their digital skills deficit.

Various efforts aim to reverse this trend, though many remain pilot projects. Mobile labs and regional development programs, including portions of the DART (Digital Agriculture and Rural Transformation) initiative, deliver digital training to rural youth, farmers, and vocational school students (ILO, 2024). These programmes build digital capabilities related to agriculture, but their reach is often limited in scope and duration. Similarly, the Digital Agriculture for Rural Transformation (DART), led by FAO, ILO, and ITU, focuses mainly on extending digital agricultural knowledge through platforms like the Farmers' Portal (UN, 2025). These tools may not directly address digital exclusion among university students. While they build rural digital access in one sector, broader, systemic solutions are still needed across education levels. Many digital inclusion initiatives depend on limited donor funding or single-phase grants. Once the initial project ends, maintenance, infrastructure upgrades and scaling efforts often stall. Without sustainable financing and institutionalization, these efforts risk remaining fragmented and short-lived. The lack of local ownership also restricts longevity. Projects led by external partners may not embed training or infrastructure into the university governance system. Once the project team withdraws, the benefits may fade without internal champions or long-term planning.

Closing the gap: suggestions for lasting impact

Closing the digital exclusion gap requires holistic and sustainable policies:

- Expand broadband access through public-private partnerships, universal service funds, and infrastructure mapping to ensure connectivity for all universities, hospitals, schools, and homes (DigWatch, 2020).
- Institutionalize SmartLabs in tertiary institutions, particularly in under-resourced regions, with ongoing technical and pedagogical support rather than one-off deployments.
- Offer dedicated funding for university digital infrastructure and faculty training in peripheral universities to level the playing field with institutions in major cities.
- Use data-driven strategies to map student digital readiness and infrastructure gaps. This ensures targeted investment in the most impacted areas.
- Integrate digital literacy into core tertiary curricula across disciplines and promote inclusive access, online libraries, coding tools, simulation platforms that bridges regional divides.
- Create sustainable models, like revolving funds or local co-financing, to ensure infrastructure maintenance and avoid pilot attrition.

Digital exclusion rooted in geography and socioeconomic background deepens the employment gap by limiting students' development of essential digital skills. Pre-university interventions such as SmartLabs testify to potential, yet inequalities persist into tertiary

education. Rural institutions lag behind, and digital readiness varies significantly across regions. While some mobile labs and sector-specific programmes offer temporary relief, their reach is narrow and uncertain in longevity. To close the employment gap, Albania must prioritize equitable digital infrastructure and literacy investments that are strategic, inclusive, and enduring.

RECOMMENDATIONS

To address the digital employment gap, a systemic transformation is required in how Albanian universities understand, teach and assess digital competences. This paper proposes five key strategies:

- Integrate Digital Learning Outcomes Across All Disciplines: Move beyond ICT courses and embed relevant digital competences in every academic program.
- Expand Professional Development for Faculty: Provide continuous training in digital pedagogy and sector-specific digital tools.
- Build Stronger University–Industry Linkages: Develop joint projects, digital internships and mentorships that mirror market conditions.
- Target Digital Exclusion: Create inclusive policies that support students from underserved regions and backgrounds with digital access and learning support.
- Establish Monitoring Mechanisms: Regularly assess digital competence integration and labour market responsiveness using frameworks such as DigComp.

These actions require joint coordination between the Ministry of Education, AKSHI, universities and the private sector, supported by EU cooperation and local policy reforms. Without such alignment, Albania risks falling further behind in regional digital competitiveness.

CONCLUSIONS

Albania's higher education system is at a turning point. Digitalisation has advanced significantly at the national level, yet universities remain fragmented in their response. The findings demonstrate that despite national efforts, higher education continues to treat digital skills as optional rather than fundamental. There are significant gaps in faculty training, weak integration of competences across curricula and limited alignment with market expectations. Regional and socioeconomic disparities further deepen exclusion, leaving many students disadvantaged. University–industry cooperation remains fragmented, with few institutionalised mechanisms for embedding workplace skills into academic programmes. The study shows that without systematic reform, Albanian graduates will remain unprepared for the digital labour market.

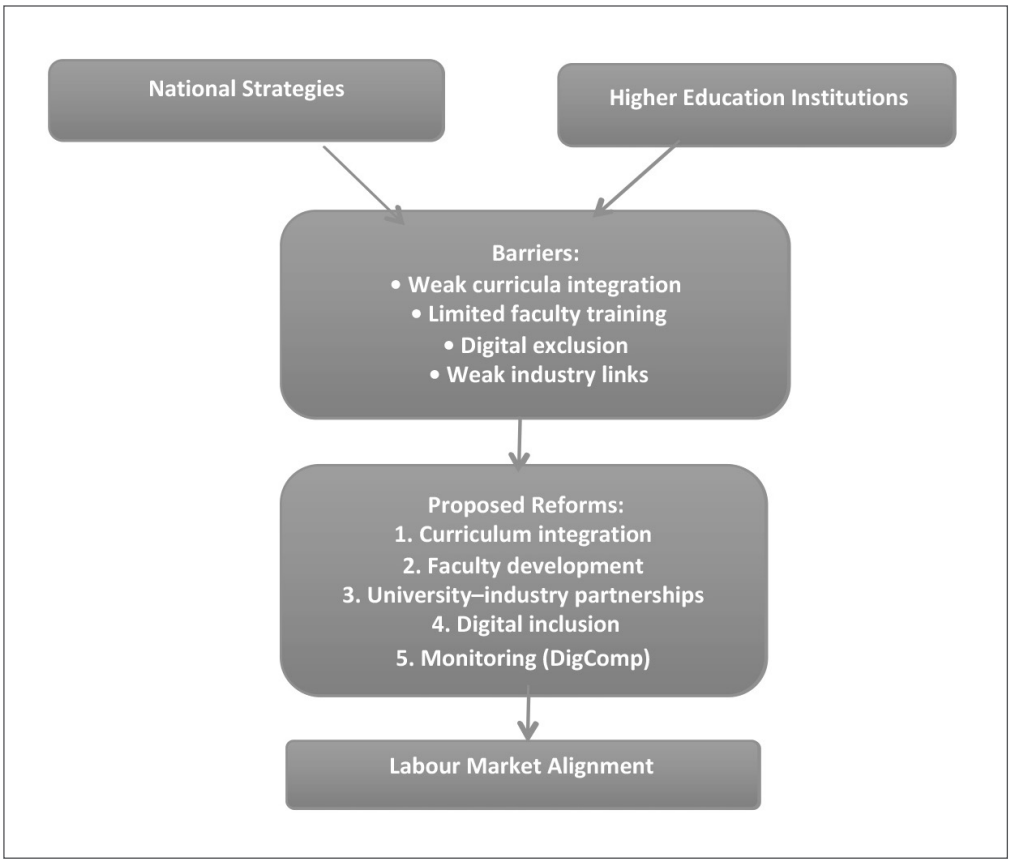


Fig. 1. Conceptual Model of the Digital Employment Gap and Proposed Reforms

Embedding digital competences, expanding faculty development and ensuring equitable access are necessary steps to reduce the digital employment gap. The study underscores the importance of systemic reform, coordinated action and continuous monitoring to prepare graduates for the future of work. The Fig. 1 illustrates the relationship between national strategies, higher education institutions, labour market demands and the proposed reforms.

REFERENCES

AKEP. (2024). Internet access: The gap between urban and rural areas continues to be large. VoxNews Albania. https://www.voxnews.al/english/biznes/aksesi-ne-internet-hendeku-mes-zonave-urbane-dhe-rurale-vijon-te-jete-i-m-i56948

AKSHI. (2023). Agreement with the University of Tirana to engage students in digital public service development. National Agency for Information Society. https://akshi.gov.al

AKSHI. (2023). DIGJIKOMP-AL project summary and institutional agreements. National Agency for Information Society. https://akshi.gov.al

Balkan Insight. (2023). Digitalization in Albania: The challenge lies in inclusion. Osservatorio Balcani e Caucaso Transeuropa. https://www.balcanicaucaso.org/eng/Areas/Albania/Digitalization-in-Albania-the-challenge-lies-in-inclusion-237592

BIRN. (2025). Village schools left behind by Albania's digital rollout. Balkan Insight. https://balkaninsight.com/2025/06/11/village-schools-left-behind-by-albanias-digital-rollout

Carretero, S., Vuorikari, R., & Punie, Y. (2022). *DigComp 2.2: The digital competence framework for citizens*. Publications Office of the European Union. https://doi.org/10.2760/670540

Demaj, E., Vladi, B., Stavre, B., Leka, K., Priku, M., & Idrizi, A. (2020). *A country report on virtual collaborative teaching and learning in Albania*. https://www.researchgate.net/publication/351719175_A_Country_Report_on_Virtual_ Collaborative_ Teaching_and_Learning_in_Albania

DigWatch. (2020). Albania's National Plan for the Sustainable Development of Digital Infrastructure (2020–2025). https://dig.watch/resource/albanias-national-plan-for-the-sustainable-development-of-digital-infrastructure-2020-2025

DigWatch. (2022). Digital Agenda of Albania 2022–2026. https://dig.watch/resource/digital-agenda-of-albania-2022-2026

Epoka University. Study Programs. https://epoka.edu.al/study-programs

ETF. (2023). Mapping digital skills gaps in the Western Balkans. European Training Foundation. https://www.etf.europa.eu/en/publications-and-resources/publications

Gugu, E., & Kristo, E. (2023). Digital skills of Albanian lecturers and students from the humanities during pandemic. *US-China Education Review A, 13*(6), 307–321. https://doi.org/10.17265/2161-623X/2023.06.006

ILO. (2024). Digital Agriculture and Rural Transformation in Albania (DART). International Labour Organization.https://www.ilo.org/projects-and-partnerships/projects/digital-agriculture-and-rural-transformation-albania-dart

INSTAT. (2024). Labour force survey 2022–2023. Institute of Statistics Albania. https://www.instat.gov.al

MDPI. (2021). Online teaching during the COVID-19 pandemic: A case study of Albania. *Governance, 12*(3), 116. https://www.mdpi.com/2076-3387/12/3/116

Ministry of Finance and Economy. (2022). Employment and Skills Strategy 2022–2030. Government of Albania. https://www.financa.gov.al

Ministry of State for Entrepreneurship and Business Climate. (2024). National innovation and startup investment programmes. Government of Albania. https://meki.gov.al

Monitor. (2024). Digital governance: Costs and benefits. *Monitor Albania*. https://monitor.al/qeverisja-digjitale-kostot-dhe-fitimet-2

Nathanaili, V. (2023). Professional passive practice mentoring system in study program 'Teaching for pre-school education' in Albanian HEI-s. European Early Childhood Education Research Journal, 32(2), 192–207. https://doi.org/10.1080/1350293X.2023.2247590

QSKN. (2023). *Digital literacies accelerator programme – U2SID*. https://u2sid.al/digital-literacies-programme

QSKN. (2024). *Enhancing digital skills and competencies while defining IT qualifications and curricula within Albania's higher education system – U2SID workshop in Tirana*. https://qskn.al/enhancing-digital-skills-and-competencies-while-defining-it-qualifications-and-curricula-within-albanias-higher-education-system-u2sid-workshop-in-tirana

RisiAlbania. (n.d.-a). *Who we are*. https://www.risialbania.al/about-us/who-we-are

RisiAlbania. (n.d.-b). *Areas: Career guidance & intermediation*. https://www.risialbania.al/areas/job-creation

UNESCO. (2021). *Albania digital education project*. UNESCO. https://www.unesco.org/en/dtc-financing-toolkit/albania-digital-education-project

UNICEF Albania. (2023). *Digital exclusion and inequality in Albania*. https://www.unicef.org/media/151936/file/Albania-2023-COAR.pdf

United Nations (UN). (2025). *Click. Grow. Thrive: How digital tools are transforming Albania's rural future*. United Nations in Albania. https://albania.un.org/en/298372-click-grow-thrive-how-digital-tools-are-transforming-albania

United Nations in Albania. (2024). *United Nations launches programme for sustainable digital transformation in Albania's agriculture*. https://albania.un.org

University of Tirana. (2022). *DIGJIKOMP-AL project: Digital competencies of public HEIs in Albania*. https://unitir.edu.al/eng/digital-competences-of-public-heis-in-albania-digjikomp-al

University of Tirana. (2024). *GovTech accelerator programme in Albania*. https://unitir.edu.al/en/banka-boterore-e-emerton-programin-govtech-te-shqiperise-si-nje-program-kryesor-global

World Bank. (2025). *Transforming institutions for inclusive services and human development in Albania*. https://www.worldbank.org/en/results/2025/07/03/transforming-institutions-for-inclusive-services-and-human-development-in-albania

PART TWO:
INSTITUTIONAL STRATEGIES AND POLICY DEVELOPMENT

INTEGRATED TECHNICAL ASSESSMENT AND RESTORATION STRATEGY FOR THE 'TOPULLI' HOUSE

Revitalization Pathways and Advanced Digital Technologies

Nikolla **VESHO**[1*], Panagiotis **KYRATSIS**[2], Ajla **GJOKA**[2], Lumturi **HASKA**[2], Sara **CIBA**[2], Migena **GJONI**[2], Ardis **DUKA**[3], Romir **MAZARI**[4]

[1]Department of Architecture and Engineering, Faculty of Architecture and Design, POLIS University, Tirana, Albania; [2]Head, Department of Product and Systems Design Engineering, University of Western Macedonia, Kozani, Greece; [2]Students at Department of Architecture and Engineering, Faculty of Architecture and Design, POLIS University, Tirana, Albania; [3]Head, Regional Directorate of Cultural Heritage Gjirokaster, Albania; [4]Department of Architecture & Engineering, Faculty of Architecture and Design, POLIS University, Tirana, Albania
*Corresponding Author: nikolla.vesho@universitetipolis.edu.al /nikolla.vesho@unife.it

Abstract

This research investigates the application of advanced digital technologies in the documentation, analysis, and conservation of this vernacular-built heritage, with a specific focus on the Cerciz Topulli House in Gjirokastra, Albania. Recognized as a key architectural and historical asset within the UNESCO World Heritage Site, the structure exemplifies 19th-century fortified domestic architecture characteristic of the region. The study was conducted as part of a collaborative restoration initiative in November 2024, involving the Faculty of Architecture, local governance units, and UNESCO. A multi-scale, data-driven methodology was implemented, integrating traditional architectural survey techniques with state-of-the-art tools including UAV-based photogrammetry, terrestrial laser scanning, and hybrid workflows in Building Information Modeling (BIM) and (hBIM). Detailed 3D geometric documentation facilitated structural assessments through finite element modeling (FEM), enabling the identification of material vulnerabilities and deformation patterns. Parametric modeling and digital reconstruction supported scenario-based analyses for future conservation planning. This interdisciplinary framework combining architectural heritage, structural diagnostics, and digital preservation demonstrates the efficacy of technologically enhanced approaches in safeguarding at-risk cultural assets. The outcomes contribute a replicable methodological model for heritage conservation in seismic and climatically sensitive contexts across the Balkan region.

Keywords: Restoration camp, metric survey, laser scanner, hBIM, Topulli house, heritage revitalization;

ABOUT THE AUTHORS

NIKOLLA VESHO

Ph.D. Ing. Nikolla Vesho is a Lecturer at the Faculty of Architecture and Design, Polis University, where he has been teaching for over 6 years. He also serves as a faculty member in the Executive Master's Program in Restoration, Conservation, and Valorization of Cultural Heritage, a joint initiative between the University of Ferrara (Italy) and Polis University (Albania). Dr. Vesho's teaching and research activities encompass 'Structural Engineering I & II', 'Theory of Structures', 'Engineering Statics', 'Restoration of Cultural Heritage', and 'Structural Rehabilitation and Strengthening'. He has played a central role in introducing 'Building Information Modeling (BIM)' into architectural and engineering curricula, linking digital survey methods with conservation practice. His doctoral research investigates the optimization of restoration traditions by integrating algorithmic programming with innovative computational workflows, including BIM, MEP, and FEM tools. He has published in the areas of seismic engineering and earthquake-resistant design, while also contributing to post-earthquake investigations following the November 2019 Albania earthquake in Durrës and Tirana, where he collaborated with expert teams and involved students in technical fieldwork. Alongside his academic career, since 2020 Dr. Vesho has gained professional experience in construction and structural design companies in Albania and Greece, where he has contributed to the design and evaluation of masonry and reinforced concrete structures, as well as heritage rehabilitation projects. Between October 2021 and June 2022, he undertook research mobility at Tor Vergata University of Rome (UniRoma2) under Prof. Donato Abruzzese and at the Polytechnic University of Bari, contributing to teaching Structural Engineering II under Prof. Aguinaldo Fraddosio.

PANAGIOTIS KYRATSIS

Dr. Panagiotis Kyratsis (www.kyratsis.com) is Professor of the Department of Product and Systems Design Engineering, University of Western Macedonia, Greece. He is the Director of the Institute of Traditional Architecture and Cultural Heritage, University Research Center "TEMENUS" and the Director of the Computational Design and Digital Fabrication Research Lab (CODE+). Prof. Panagiotis Kyratsis received his PhD in CAD-based manufacturing process simulations from the Department of Production Engineering and Management, Technical University of Crete, Greece. He holds a diploma in Mechanical Engineering from the Aristotle's University of Thessaloniki - Greece, and he received his M.Sc. in Automotive Product Engineering and M.Sc. in CAD/CAM from Cranfield University, UK. He has been involved in several industrial projects, and he has a great deal of expertise in both the design and the manufacturing aspects of product development. His main research interests include manufacturing/machining, CAD/CAM/CAE systems, computational design, Artificial Intelligence (AI), additive manufacturing (AM), CAD-based applications, product design, reverse engineering and prototyping. He has published more than 20 books and more than 200 papers in Scientific Journals and

International Conferences. He acts as member of the editorial board and reviewer to numerous scientific journals and holds 12 industrial designs and two patents registered within the Greek Patent Office.

AJLA GJOKA

Ajla Gjoka is a final-year student at the Faculty of Architecture and Design, Polis University, Tirana. Over the course of her academic journey, she has cultivated a strong foundation in architectural theory and practice, enriched by diverse professional and extracurricular experiences. She has actively participated in several workshops and competitions, including a national design competition where her team won first prize, an achievement that reflects both her creativity and collaborative skills. In 2024, she joined a restoration camp in Gjirokastër, contributing to the conservation of the historic Topulli House and gaining valuable hands-on experience in heritage preservation. Currently, Ajla is employed at an architecture studio in Tirana, where she is involved in ongoing design and construction projects, further developing her technical expertise and professional competence. Her international exposure includes participation in a summer school in Italy, organized in collaboration with the Universities of Reggio Calabria and Naples. The project, Sulieia, adopted an interdisciplinary approach to urban and architectural challenges and continues to inform her academic research, laying the groundwork for her diploma thesis. Driven by a passion for design innovation, cultural heritage, and sustainable architecture, Ajla aspires to build a career dedicated to creating meaningful, context-sensitive, and resilient built environments.

LUMTURI HASKA

Lumturi Haska, 22, originally from Gjirokastra, is a fifth-year architecture student at Polis University, Albania. Deeply passionate about architecture, cultural heritage, and design innovation, she actively combines academic studies with practical experience, aiming to bridge theoretical knowledge with real-world applications. She has participated in several international Tirana Architecture Weeks (TAW) workshops, where her creativity and commitment to architectural design were recognized with a first-prize award in one edition. In addition, she took part in two consecutive Restauro Camps in Gjirokastra (2023 and 2024), engaging directly with restoration and conservation practices. These immersive experiences not only enhanced her technical skills but also reinforced her dedication to the preservation of architectural heritage and historic urban environments. Her professional journey began in 2024 with an internship at a local architectural studio, where she translated academic knowledge into practice by contributing to active projects. Building on this foundation, she continues to work at the same studio throughout 2025, expanding her skills in design development, documentation, and project implementation. Looking ahead, Lumturi aspires to pursue a career that integrates professional practice with academic research, with a strong focus on restoration, sustainable design, and the conservation of cultural heritage. At 22, she is committed to advancing her expertise and contributing meaningfully to both her community and the broader architectural profession.

SARA CIBA

Sara is a fifth-year student at the Faculty of Architecture and Design, Polis University, Tirana. As part of her academic training, she actively participated in the Restoration Camp in Gjirokastër, where she contributed to the documentation and observation of historic monuments. This experience offered her valuable, hands-on exposure to conservation practices, strengthening her understanding of fundamental methods for preserving and restoring cultural heritage within its authentic context. Her academic interests center on sustainable architecture, the conservation of built heritage, and the integration of contemporary digital tools such as photogrammetry and BIM into design and documentation processes. Through her studies and practical experiences, she has developed an interdisciplinary perspective that combines architectural design, heritage conservation, and technological innovation. Sara aims to further advance in the field of architecture by contributing to projects that promote cultural continuity while addressing contemporary needs, ensuring a balance between tradition, sustainability, and modern practice.

MIGENA GJONI

Migena Gjoni is a fifth-year student at POLIS University, enrolled in the Architecture and Urban Design program. Her academic focus lies in integrating theory with practice to design sustainable spaces that balance functionality, cultural relevance, and human well-being. She has actively participated in a range of academic and professional initiatives, most notably the restoration camp in the historic city of Gjirokastër. During this project, she contributed to the surveying, documentation, and presentation of the existing structure, as well as the identification of necessary structural interventions. Her work further extended to the development of a restoration and adaptive reuse proposal, an experience that refined her technical skills in structural analysis, conservation strategies, and context-sensitive architectural design. In addition to academic engagements, Migena has undertaken internships and collaborations with architectural studios, where she has worked on both collaborative and independent projects. These experiences have allowed her to apply university knowledge in professional contexts, deepening her ability to link architectural design with cultural, social, and environmental dimensions. Her professional ambition is to advance in the fields of architecture and urban design, with a particular commitment to creating spaces that honor cultural heritage while fostering sustainable and innovative opportunities for contemporary urban development.

ARDIS DUKA

Ardis Duka is a civil engineer and currently serves as the Director of the Regional Directorate of Cultural Heritage in Gjirokastër, a position he has held for more than two and a half years. He has substantial experience in the restoration, conservation, and management of cultural monuments, coordinating major projects dedicated to the preservation and valorization of tangible heritage in southern Albania. Following his undergraduate degree in Civil Engineering, he pursued an Executive Master's in Monument Restoration and

Heritage Valorization, strengthening his technical expertise with advanced training in heritage conservation. His professional work emphasizes the integration of modern conservation methodologies with traditional construction techniques, ensuring both structural resilience and authenticity in restoration practices. In addition to his technical and managerial responsibilities, Mr. Duka actively promotes cultural heritage as a catalyst for sustainable community development, advocating for its role in fostering local identity, education, and cultural tourism. His leadership at the Regional Directorate has positioned him at the intersection of engineering, heritage management, and cultural policy, contributing to the safeguarding and revitalization of one of Albania's most significant historical regions.

ROMIR MAZARI

Romir Mazari is a graduate architect from Polis University, Albania. He holds a Professional Master's degree in Cultural Heritage from the Polytechnic University of Tirana and a Master of Science degree in Archaeology from the University of Tirana. In 2024, he further completed a Master of Science in Agro-Environmental Engineering at the Agricultural University of Tirana. Currently, he is engaged as a partner at Grama shpk, a company active in the fields of construction, cultural heritage, and environmental projects. Previously, he worked at the National Institute of Cultural Heritage in Albania, where he contributed to the documentation, conservation, and management of architectural heritage. In parallel with his professional practice, he serves as an external lecturer at Polis University, where he shares his expertise with architecture students in heritage-related courses. His professional experience spans across architecture, archaeology, construction, and environmental studies, with a particular focus on the preservation and sustainable management of cultural heritage assets. His research and professional interests include monument conservation, restoration practices, and the integration of environmental considerations into heritage management strategies.

INTRODUCTION

Situated in southern Albania, the historic city of Gjirokastra was recognized by UNESCO in 2005 for its outstanding example of Ottoman-era urban fabric in the Balkans. The city's traditional architecture carefully adapted to the steep terrain of the Drino Valley offers valuable perspectives on historical urban life and cultural continuity in the region.

Efforts to safeguard its architectural heritage began in 1961, when Gjirokastra was declared a "museum city," leading to the official protection of over 600 traditional structures from a total of 1,220 [30, 26]. The city's form and construction practices evolved in direct response to its mountainous setting, climatic conditions, and socio-economic context [20]. Central to Gjirokastra's architectural identity are the tower houses multi-functional buildings that combined domestic and defensive roles. These structures, commissioned during the Ottoman period and built by skilled artisans from surrounding regions, symbolize the city's former wealth and regional importance [4, 10, 17].

Historic settlements such as Gjirokastra, a UNESCO World Heritage Site, embody a unique synthesis of urban morphology, vernacular architecture, and traditional construction techniques. Characterized by steep topography, stone-paved alleys, and a dense fabric of fortified tower houses, the city reflects centuries of socio-cultural layering and architectural adaptation. These buildings, typically constructed with local limestone, wood-framed upper floors, and slate roofs structure, represent a remarkable integration of structural ingenuity and aesthetic identity within a challenging terrain [4, 17].

The architectural value of Gjirokastra lies not only in its individual monuments but in the coherence of its urban ensemble, shaped by Ottoman-period spatial organization and adapted to the mountainous landscape [4]. Restoration efforts must therefore engage with the material authenticity and typological complexity of the built environment preserving original elements such as carved stone details, wooden ceilings, and traditional ventilation systems, while addressing structural vulnerabilities arising from age, seismic risk, and environmental degradation [10, 15].

This study focuses on the restoration of architectural heritage in Gjirokastra, highlighting the need for context-sensitive methodologies that combine historical research, building diagnostics, and compatible material interventions [36]. It aims to contribute to a sustainable conservation model that reinforces both the physical integrity and cultural significance of the city's historic fabric. Beyond its conservation focus, the study also highlights the pedagogical dimension of digital heritage tools. Integrating methods such as BIM, photogrammetry, and parametric simulation within Higher Education enhances students' digital literacy and critical problem-solving skills, preparing future professionals to address heritage conservation with both technical competence and cultural sensitivity.

'TOPULLI' HOUSE, ARCHITECTURAL AND HISTORICAL REVIEW

The Çerçiz Topulli House, located on the slopes of Dunavat in Gjirokastër, is among the earliest fortified residences built outside the city's medieval castle. Constructed in the early

19th century by Mehmet Topulli, the structure exemplifies the kullë typology traditional tower houses that combined residential and defensive functions, characteristic of Ottoman-influenced Balkan architecture [15] (see Fig. 1a, 1b).

a)

b)

Fig. 1. a) Archival photograph of the Topulli House, showing the external architectural configuration within its historical urban context, alongside an interior view of the main room (oda e burrave), highlighting its traditional spatial layout and integrated timber furnishings; b) Recent images showing the current state of preservation, structural alterations, and material degradation (*Source:* IKTK-Archive).

The house is most renowned as the birthplace of Çerçiz Topulli (1880–1915), a prominent figure in the Albanian National Awakening. Alongside his brother Bajo, he led one of the first armed bands against Ottoman forces in southern Albania. Their assassination of the Ottoman commander Halil Musa Bey in 1908 and the subsequent Battle of Mashkullorë marked key moments in the nationalist movement [28, 29]. In 1967, the residence was converted into the National Awakening Museum, initiated by museologist Lefter Dilo. It displayed artifacts linked to Topulli and the broader independence struggle. Although officially titled the Museum of National Renaissance, it remains widely known as the Çerçiz Topulli Museum [15, 28] (see Fig. 1a). While parts of the house are still inhabited by descendants, preservation efforts remain limited, and structural degradation poses ongoing challenges (see Fig. 1b).

ARCHITECTURAL SURVEY, SITE WORK INSTRUMENTS AND METHODOLOGY

Architectural survey

The surveying of historic buildings constitutes an indispensable stage in the restoration workflow, providing the critical empirical foundation upon which all subsequent project interventions depend. It is imperative that extant documentation comprising preliminary sketches, architectural drawings, and previously acquired geometric measurements be meticulously synthesized with newly collected observational data. This integration must be executed through a systematic, methodical framework to produce a coherent, structured, and comprehensive dataset. Such rigorously compiled data serves not only as a reliable baseline for the ongoing design and planning phases but also as an authoritative reference that supports informed decision-making throughout the restoration process. Ensuring the precision, consistency, and traceability of this combined information is essential to uphold the scientific and technical standards required for the successful preservation and rehabilitation of historic structures [22].

Fig. 2. Integrated on-site data acquisition procedures for the digital survey of the Topulli House: a) UAV-based photogrammetry using DJI Mavic 3E for contextual 3D modeling and orthophotos; b) Manual sketches and metric measurements to validate non-digital data; c) Terrestrial LiDAR scanning with FJD Trion P1 for high-precision façade geometry; d) Real-time point-cloud monitoring within the FJD platform for in-situ data validation.

Digital Surveying Methods and Detail Extraction: Current State and Technological Tools

Another important aspect is the level of detail, which must be appropriately represented in the final product. To make a well-founded decision in this regard, the input of an expert user is essential. A survey product whether a line drawing or an image inevitably involves a certain degree of generalization. Therefore, the criteria and boundaries of this generalization must be carefully defined, always in close collaboration with the architect, who possesses in-depth knowledge of the monument [13].

For geometric registration, a range of surveying methods can be employed, spanning from basic topometric techniques to advanced contemporary surveying and photogrammetric approaches. Traditionally, due to financial limitations and scientific obligations, simpler topometric methods were favored. However, negative outcomes associated with these techniques, coupled with technological advancements in surveying and photogrammetry, as well as prevailing international trends, have driven a fundamental shift in this approach [34].

Actually, the geometric survey of cultural heritage monuments utilizes two principal categories of methods:

- Simplified topometric approaches, often applied in cases where full survey control is not feasible or necessary, generally serving preliminary documentation or rapid assessment needs;
- High-precision techniques such as LiDAR scanning and photogrammetry, which facilitate fully controlled spatial data acquisition, ensuring detailed and accurate geometric representations essential for restoration planning, structural analysis, and long-term heritage conservation [2, 5, 7, 13, 22] (Fig. 2a); Basic topometric methods are applied selectively and only in situations where the monument's scale and structural simplicity justify their use typically in cases where limited precision is acceptable or when they serve as a supplementary tool to enhance more advanced surveying approaches. Conversely, modern techniques such as terrestrial photogrammetry and LiDAR-based surveying are grounded in the accurate acquisition of linear and angular measurements, either from the physical structure or its visual representations. These methods enable the reconstruction of three-dimensional spatial data within a unified coordinate system, ensuring a high degree of geometric reliability and reproducibility [2, 5, 7, 13, 22, 34]. Beyond their technical accuracy, these methodologies offer distinct operational benefits, including versatility in application, rapid data acquisition, enhanced safety in fieldwork, and overall procedural efficiency. Crucially, from an economic perspective, they demonstrate clear cost-effectiveness, often emerging as the most viable solution for comprehensive heritage documentation by minimizing resource expenditure while maximizing data quality and utility [13, 22].
- Advanced Scanning methods of built heritage using FJD Trion laser: The scanning and documentation of historic buildings increasingly leverages cutting-edge LiDAR scanning technology, such as the FJD Trion P1 laser scanner, to achieve highly detailed spatial records (see Fig. 2c, 2d). This portable 3D laser scanner employs real-time

SLAM[1] technology, enabling rapid acquisition of up to 320,000 points per second with a spatial accuracy of around ±2 centimeters [37]. These features make it particularly effective for capturing the complex geometries typical of heritage architecture. Data collected by the scanner is exported into standard point cloud file formats like LAS, PLY, or E57, which can be processed through dedicated software including FJD Smart LiDAR or popular third-party tools like Cloud Compare and Autodesk Recap [14, 18, 34, 37]. The processed point clouds are then incorporated into Building Information Modeling (BIM) systems through specialized point cloud-to-BIM workflows, facilitating the creation of precise 3D models that support conservation planning and management (see Fig. 5). Integrating these advanced scanning techniques with BIM significantly enhances the precision, efficiency, and comprehensiveness of built heritage documentation and preservation strategies [1, 3, 5, 14, 18, 34, 37].

VERNACULAR ARCHITECTURE OF GJIROKASTRA AND THE CASE OF CERCIZ TOPULLI HOUSE

Gjirokastra house typology and architectural elements

Characteristics and elements of Gjirokastër Houses and Architectural Design Influenced by Ottoman Style: Many tower-type house typologies in Gjirokastër date from the late Ottoman period. These buildings exhibit greater refinement compared to earlier versions, incorporating certain stylistic elements derived from the Ottoman Rococo of the era; however, their defensive characteristics remain prominently visible [4, 6, 10].

The city's location on a steep, uneven rocky mountainside imposed significant constraints on construction; nevertheless, the selection of such a challenging site was a deliberate strategic decision. A 19th-century English traveler observed that rival families erected their towers in disadvantageous locations such as valleys and rocky outcrops where they could sustain their disputes over extended periods without any decisive resolution [10, 17].

Externally, Gjirokastra houses appear exceptionally robust and austere, with massive stone walls. These walls, typically tall and somewhat narrow in plan, convey a formidable, fortress like impression (see Fig. 3). Stone, as the most durable locally available construction material of the time, dominates the urban fabric: house walls were built from rectangular stone blocks meticulously carved by skilled artisans, roofs were clad with flat grey stone slabs, and streets were paved with stone cobblestones [15, 19, 34].

The presence and height of one or more chimneys held symbolic significance. Only affluent families were permitted to construct chimneys on their roofs; the greater the chimney's height, the higher the family's social status. The lower floors featured bare walls constructed from exposed stone masonry without plaster or decorative cladding. Architectural ornamentation was minimal. Despite limited enforcement by the Ottoman administration regarding minimum window opening sizes on façades, windows on the lower levels were either very small or altogether absent [28, 29]. When present, these openings were arched and functioned defensively as embrasures. (see Fig. 3) [15, 28, 34]

[1] *Note:* Simultaneous Localization and Mapping technology.

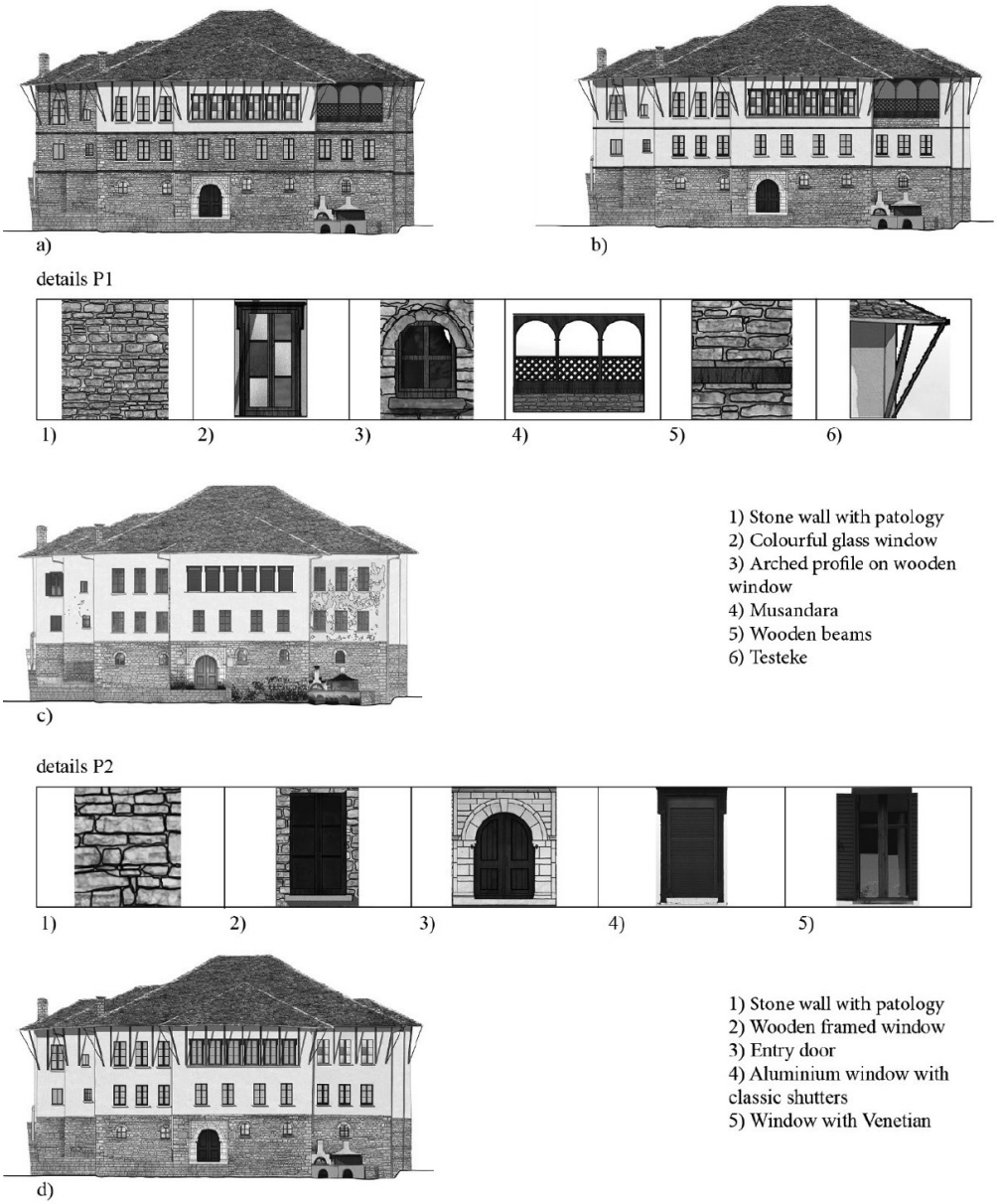


Fig. 3. BIM-based reconstruction of the Topulli House illustrating key phases of architectural transformation: a) Archival-based BIM model representing the original 19th-century configuration; b) BIM model reflecting alterations from the communist era, including façade modifications; c) Current condition model documenting structural deterioration and material loss; d) Proposed revitalization scenario integrating recovered vernacular features to restore architectural authenticity. Detail views (Part 1 & 2) emphasize typological elements of Gjirokastra's vernacular architecture, such as musandara, testeke, and stained-glass fenestration, as captured through heritage-informed modeling strategies.

Construction techniques in Berat and Gjirokastër exhibit a synthesis of indigenous Albanian and Ottoman influences. The robust stone masonry employed on the ground floors traces back to the traditional Albanian rural defensive tower known as the "kullë". In contrast, the upper levels incorporate a timber-framed system (çatma), complemented by wooden laths and plaster finishes, as well as a series of window openings and balconies. These elements reflect the characteristics of Ottoman urban architectural practices (Fig. 3) [6, 26, 28, 29]. The predominant construction material in the city is locally sourced stone, utilized extensively in the fabrication of walls, roofing, street pavements, and courtyards. These elements are primarily composed of limestone blocks or slabs alongside native shale deposits [19, 28, 29, 34, 35]. Timber serves a crucial role in structural reinforcement, being employed in masonry support, as well as in the frameworks of floors, roofs, and upper wall sections.

Architectural Context and Vernacular Elements of the Topulli House

The Topulli House exemplifies the single tower-type vernacular architecture. Its composition reflects the typical tripartite structure of fortified Albanian dwellings, with a robust masonry ground floor and lighter timber-framed upper levels (see Fig. 3). The stone base constructed from irregularly coursed local limestone served utilitarian functions such as storage, stabling, and wine or food preservation. In contrast, the upper floors exhibit more refined spatial and material treatments, featuring plastered timber frames, extensive fenestration, and wide overhanging eaves (testek), supported by timber rafters anchored into the masonry [4, 10]. These eaves (extending 50–60 cm) are a key regional trait, protecting façades and enhancing climatic performance [26] (Fig. 3).

The primary façade, oriented north toward the bazaar, demonstrates the social significance of architectural ornament and visibility in Gjirokastër's domestic tradition (see Fig. 1a). It incorporates tall, multi-pane windows, once integrated within a double-story wooden loggia, reconstructed in the recent restoration. This element historically expressed wealth and status through its spatial prominence and crafted timber detailing. Roofing consists of a steeply pitched stone-slab covering typical of the region, laid over timber rafters extending outward to form deep eaves. Decorative friezes under the eaves and wooden shutters have been reinstated to reflect the original aesthetic. The limited fenestration on the secondary façades underlines the defensive and climatic logic of the vernacular type [24, 26].

Internally, the spatial organization follows a simple central circulation scheme. The ground floor contains the stera (entry hall and rainwater catchment), paved in large stone flags and lit by narrow arched openings. Flanking this space are plain vaulted rooms serving as stables or storage. Timber stairs lead to the upper level, which hosts the oda e burrave (men's guest room), distinguished by a prominent stone fireplace and decorative cabinetry (dollap). Materials include lime-plastered walls, wood-beamed ceilings, and locally sourced carved stone elements (Fig. 3) [34].

Historical Evolution and Transformations of the Topulli House

The Topulli House, constructed in the late 19th century by the Topulli family, exemplified the defensive and domestic vernacular of Gjirokastër's tower typology. The structure manifesting both structural ingenuity and symbolic authority. Internally, its carved woodwork, stone arches, and ornamented ceilings reflected a synthesis of craftsmanship and social function (Fig. 3a) [6, 10].

During the early 20th century, the house served as a residence and discreet meeting site for nationalist leaders Çerçiz and Bajo Topulli. World War II inflicted major damage, especially due to fire in the 1940s, reducing the upper structure to a ruinous shell. Restoration commenced in 1967 under the communist regime, repurposing the house as the Museum of the National Renaissance. Although partially reconstructed, the restoration prioritized ideological messaging over architectural fidelity, simplifying original forms, plastering façades, and removing distinctive structural elements such as *testekët* (Fig.3, detail 6) [28, 29].

Subsequent alterations in the 1970s further homogenized the building's expression, replacing vernacular materials with standardized components (Fig. 3b). After 1991, the building was returned to the Topulli house, falling into partial neglect and informal residential use. By the 2010s, minimal conservation occurred, and degradation of wooden features continued.

In 2020, a municipal agreement-initiated effort for formal musealization, marking a paradigm shift toward integrated heritage stewardship (Fig. 3c). Presently, the house operates as both a semi-public museum and a lived-in residence, incorporating modest interventions secondary entrances, essential amenities without compromising the structural integrity or authenticity of the original timber and stone elements. This coexistence underscores a rare model of heritage continuity: an adaptive space balancing conservation, commemoration, and contemporary habitation.

CURRENT CONDITION, FUNCTIONAL ALTERATIONS, AND MATERIAL PATHOLOGIES

The Topulli House retains its historical character and spatial configuration, representing a critical example of Gjirokastër's vernacular fortified dwellings. While the original form remains legible, the structure has undergone a series of incremental interventions reflecting shifts in function and material adaptation [17]. These changes ranging from spatial reconfiguration to selective material substitutions demonstrate a dynamic balance between preservation ethics and evolving user needs.

One notable alteration is the insertion of a secondary access point on the rear façade, introduced by the resident family. A minimally-roofed transitional volume was appended at ground level, enabling a private entrance distinct from the main museum access. This adaptation underscores contemporary spatial negotiations between private residency and public heritage function. Although spatially modest, the intervention redefines circulation hierarchies and reflects modern living requirements absent from the original plan [28, 29].

Internally, most rooms retain their original dimensions and intended functions, though selective updates such as aluminum window frames and the loss of stained-glass elements reflect thermal performance upgrades and maintenance constraints. The removal of significant architectural components, including the *çatma* framing and *testekë* (timber eaves), has diminished both the tectonic clarity and visual legibility of the façades.

Material assessments identified pronounced deterioration, especially along the northeast façade, attributed to inadequate solar exposure and persistent atmospheric moisture. Pathological manifestations include biological colonization (moss, mold), plaster delamination from rising damp, salt efflorescence, staining, root intrusions and structural cracking around fenestrations (see Fig. 4) [19, 21]. These are consistent with age-induced decay in hybrid masonry buildings, exacerbated by previous unsympathetic repairs and systemic maintenance neglect.

Fig. 4. Current pathological analysis conducted on the façades of the Topulli House, identifying material deterioration, structural anomalies, and signs of environmental damage

Overall, the building illustrates the dual pressures of heritage preservation and functional adaptation. While core structural systems persist, selective material and spatial interventions reflect a continuous negotiation between authenticity, performance, and domestic utility [9].

BIM-Based Architectural Analysis and Restoration Strategy

A Building Information Modeling (BIM) framework was developed in Autodesk Revit to document, analyze, and simulate the conservation needs of the Topulli House. The model integrates data derived from photogrammetric point clouds and terrestrial 3D laser scans (FJD), enabling precise alignment between historical documentation and current structural conditions [3, 5, 7, 16, 36]. The parametric model reflects the architectural stratigraphy of the 19th-century building, including traditional Gjirokastra elements such as stone masonry walls, "musandara" (built-in wooden cupboards), stained-glass fenestration, and "testeke" (projecting wooden eaves) [22, 23]. These culturally embedded elements were classified and modeled as Revit families for accurate representation and scheduling (see Fig. 5).

Fig. 5. BIM architectural evolution model in Revit: (a) original 19th-century elements including stone masonry and stained glass; (b) 1940s interventions with plastered masonry, testeke (exposed timber beams), wooden frames and window alterations reflecting progressive material degradation; (c) current state marked by aluminum window replacements, façade moisture damage, cracking, and loss of testeke (timber components); (d) restoration proposal focused on reinstating original materials and features wooden windows, testeke, stained glass and cleaning masonry to restore structural authenticity and heritage value.

Chronological transformations, particularly those occurring post-1940, were incorporated into the model to assess the degradation of authenticity over time. Modifications such as cement plastering, removal of traditional features, and installation of

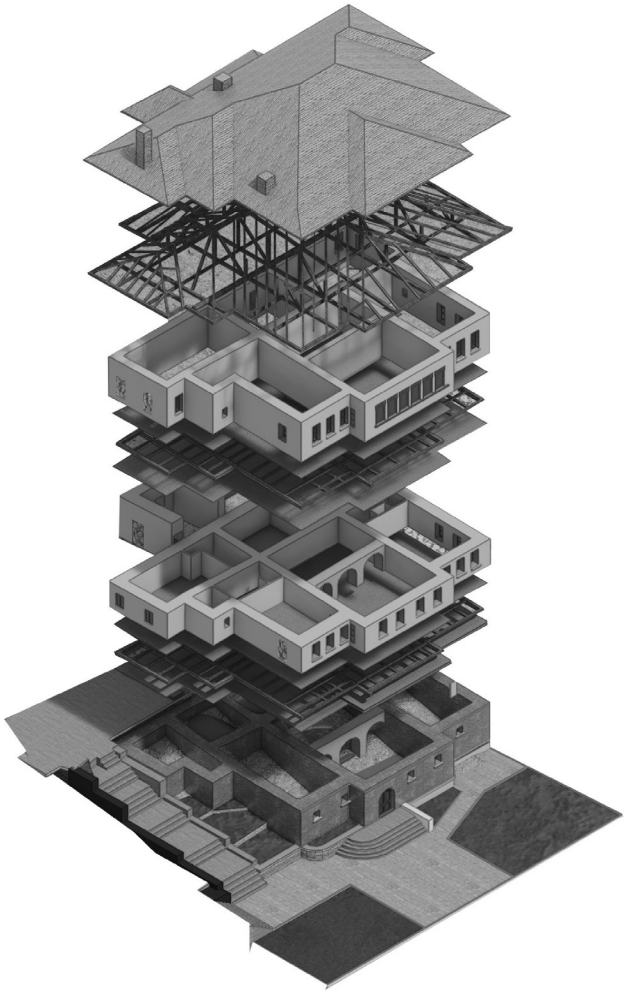
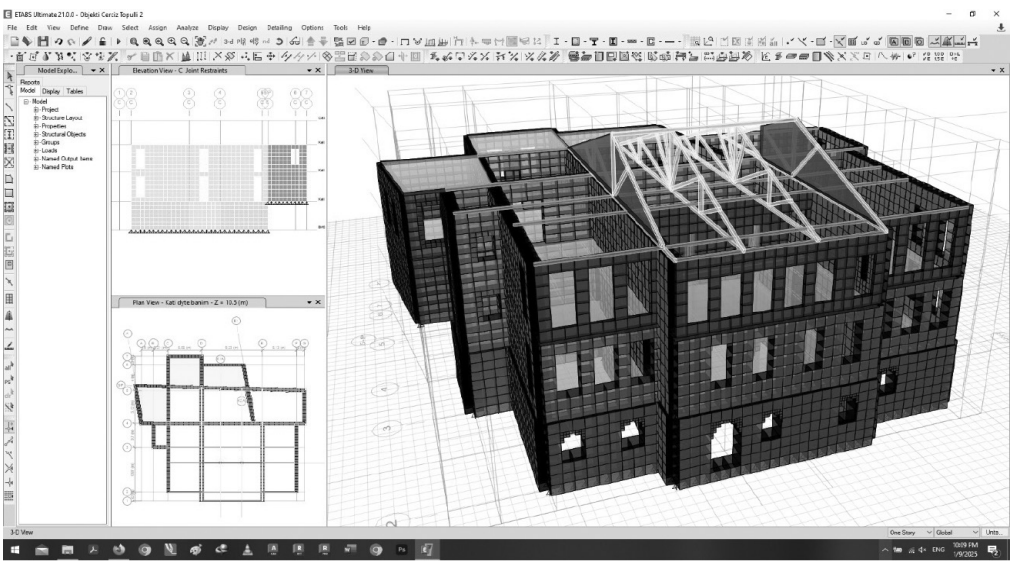


Fig. 6. 3D Axonometric exploded view of the building developed in a BIM environment using Autodesk Revit, with post-processing enhancements and graphical refinements carried out in Adobe Photoshop to highlight architectural stratification and element assembly

aluminum window frames were documented and distinguished through phasing tools within Revit [36]. The BIM model supports a restorative approach that simulates the reintroduction of historically significant elements, including wooden frames, stained glass, and wooden testeke (see Fig. 3) [3, 7]. These are proposed as reversible and compatible interventions aligned with the Venice Charter principles [32]. The model serves as both a diagnostic and prescriptive tool, enabling multidisciplinary coordination for heritage preservation through informed, data-driven decisions. BIM allows for the temporal documentation of architectural evolution, offering not only an accurate depiction of the building's current condition but also a historical narrative that captures lost architectural elements facilitating their potential reconstruction in future restoration scenarios [16, 18, 36].

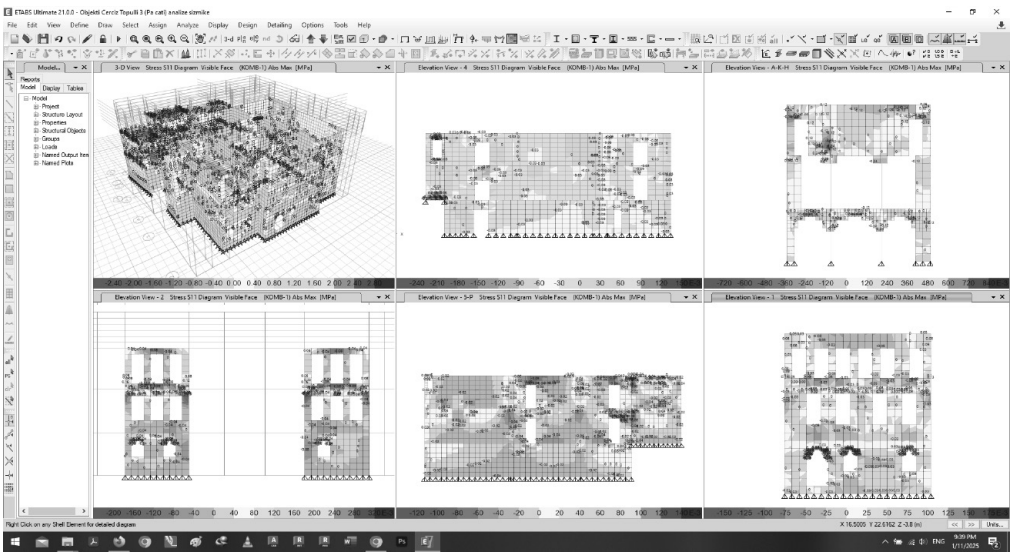
Structural Modeling Using ETABS v22: using F.E.M. Modelling

The structural analysis was independently carried out using ETABS v22, separate from the BIM modeling workflow (see Fig. 7a). The model was based on architectural plans and survey data derived from the current condition of the building, captured using the FJD Trion P1 laser scanner. This approach ensured a high level of geometric accuracy, critical for reliable structural simulation. The modeling primarily focused on the stone masonry walls, incorporating vertical reductions and accounting for the presence of traditional infill elements such as "çatma" [2]. Floor systems were represented using Slab type: thin shell elements with timber joists, modeled in accordance with the on-site measurements and construction details observed on-site [21, 26, 29, 31]. Foundation conditions and soil–structure interaction were idealized through fixed joint supports at relevant elevations, based on the presence of continuous stone strip footings combined with lean concrete layers [29, 31]. These details were further informed by the site's topographical gradient and subsurface soil characteristics (see Fig. 7a). A key aspect of the simulation involved the accurate assignment of material properties. The mechanical behavior of the stone and mortar was modeled using characteristic parameters derived from prior research and literature specific to historic masonry [31-36]. These material inputs were essential for representing the nonlinear and anisotropic response typical of vernacular heritage structures. Non-structural components, such as wood staircases and secondary roof layers, were introduced as static loads. The roof framework, characterized by irregular spatial trusses, was partially modeled, while later structural additions were included as supplementary loading (see Fig. 7a). Service loads and superimposed dead loads, including finishing layers and flooring systems, were incorporated in accordance with Eurocode load standards [12, 26, 29, 31, 34].



a)

[2] *Note:* A timber-framed wall filled with a lightweight infill material such as stone rubble, adobe, or mud brick, often plastered over. This technique is part of Ottoman vernacular architecture and is commonly known across the Balkans and Anatolia.



b)

Fig. 7. a) Geometric representation of the 3D finite element model in ETABS; b) Stress distribution diagram along the principal axes of the stone masonry walls.

A sequence of finite element simulations was performed. An initial static analysis assessed the structure's current performance and stability. This was followed by a seismic analysis, simulating the response under the load combinations, as prescribed by contemporary Eurocode provisions [11, 12, 27] (see Fig. 7b). The seismic assessment provided insight into the vulnerability of specific structural components and allowed for the evaluation of stress distribution throughout the entire building envelope [21, 31] (see Fig. 7b). Numerical results included internal force diagrams and stress contour plots, offering valuable data for diagnosing structural deficiencies. These outputs form the basis for developing a targeted seismic retrofitting strategy, a critical intervention step in the structural rehabilitation and conservation of historic buildings within the framework of cultural heritage preservation.

Revitalization and Adaptive Reuse Strategy: "Penë dhe Plumba" (Quills and Bullets). A Heritage-Driven Cultural Reimagining

The initiative outlines a comprehensive revitalization strategy for the historic Topulli House, converting it into a dynamic cultural and historical museum that reflects the tangible and intangible heritage of the Gjirokastra region. This project prioritizes the preservation of the building's architectural and cultural identity while promoting active public engagement (see Fig. 8). Departing from conventional conservation paradigms, it reimagines the house as an interactive environment, leveraging immersive technologies such as Virtual Reality (VR) and Augmented Reality (AR) to facilitate physical, emotional, and intellectual visitor interaction [22, 36].

The visitor journey commences on the fully operational ground floor, dedicated to historical interpretation. This space integrates preserved stone masonry, authentic porticos, original mural fragments, and remaining architectural details that collectively embody the building's original fabric. Advanced audiovisual installations and projection mapping techniques reconstruct critical historical episodes, delivering an immersive multisensory narrative (see Fig. 8).

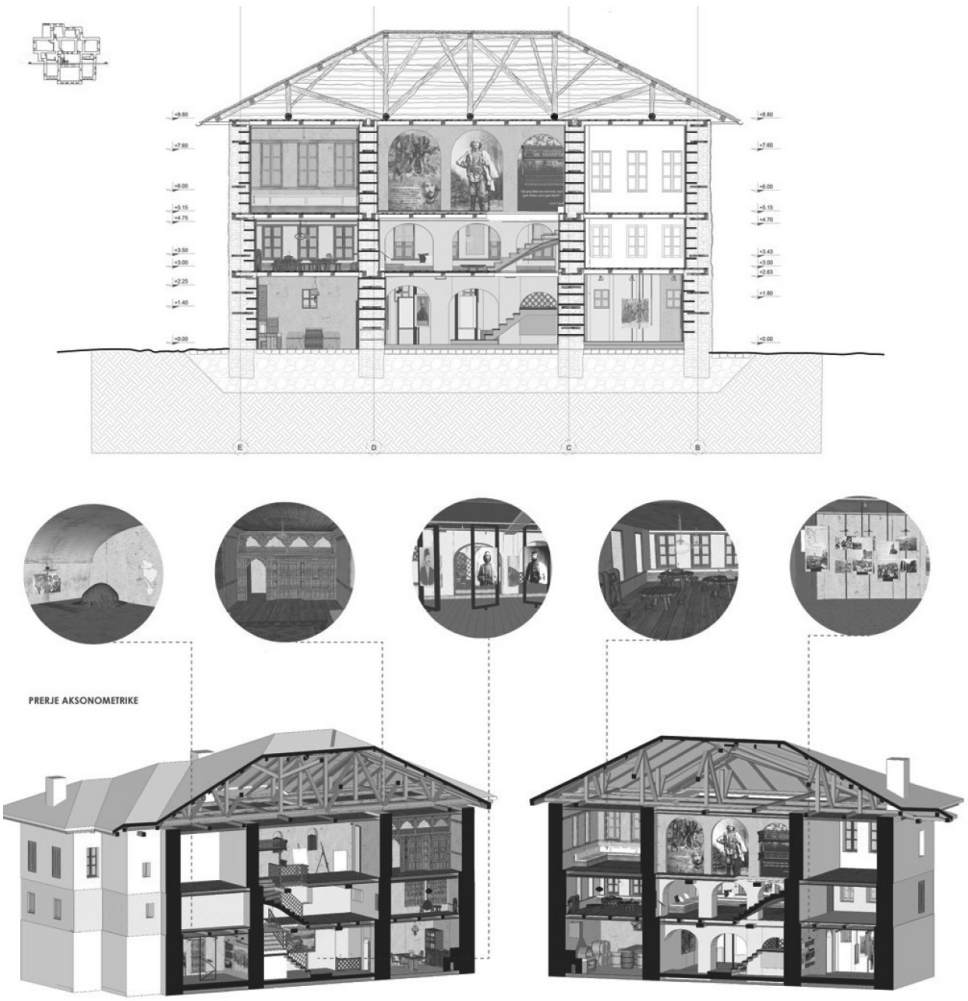


Fig. 8 Summarized images of the proposed revitalization strategy for the historic Topulli House, developed through BIM using Revit software.

The project also reinstates the traditional Gjirokastra kitchen as a living exhibit, enabling experiential engagement with local culinary heritage. Adjacent artisanal workshops provide hands-on access to traditional crafts, spotlighting local master artisans and preserving vernacular production techniques once practiced on-site. These elements enrich the

first-floor program, layering cultural education with tangible heritage. On the second floor, focus shifts to the meticulous architectural and symbolic restoration of the "oda e burrave" (men's guest room), a quintessential element of Gjirokastra vernacular housing. Reconstructed based on archival documentation, this space features authentic wooden elements including intricately carved ceiling rosettes, built-in wardrobes, and musandara cabinetry. The intervention emphasizes material fidelity and artisanal detail to recover lost heritage and reinstate the room's cultural significance (see Fig. 8) [22]. Throughout, all conservation and restoration interventions are rigorously aligned with international charters, emphasizing retention of original spatial organization and material authenticity [30]. This ensures the Topulli House's historical integrity is preserved while enabling its sustainable reuse as a culturally vibrant public asset.

CONCLUSIONS

This study proposes a multidisciplinary methodology for the documentation, analysis, and structural assessment of vernacular architecture, with a focus on the Çerçiz Topulli House in Gjirokastra. It demonstrates how combining historical research, digital technologies, and structural modeling enables a more comprehensive and context-sensitive approach to conservation in seismically active and topographically complex urban heritage sites. From an architectural and heritage perspective, the research reaffirms the cultural and typological value of Gjirokastra's historic dwellings. These fortified stone houses with timber-framed upper floors (çatma), carved stone detailing, and slate roofs exemplify a sophisticated synthesis of Ottoman design principles and local construction traditions. Preserving such structures demands careful attention not only to individual elements but also to the urban coherence of the ensemble and the socio-historical layers it represents.

The integration of advanced documentation technologies specifically, terrestrial photogrammetry, the FJD Trion P1 mobile LiDAR scanner, and Building Information Modeling (BIM) has proven essential for capturing the building's current condition with high spatial accuracy. The FJD Trion P1, utilizing real-time SLAM technology, enabled rapid and detailed 3D data acquisition, while photogrammetry supported texture-rich visual reconstruction of the architectural envelope. This multi-sensor approach produced a precise, data-rich point cloud, which was subsequently processed into a BIM environment. The BIM model served as a central platform for managing geometric, material, and structural information, facilitating not only documentation but also analytical interpretation and restoration planning.

In the realm of structural engineering, finite element analysis using ETABS based on the BIM-integrated point cloud data allowed for realistic simulation of the building's seismic behavior. The model incorporated historic material properties, structural anisotropy, and site-specific boundary conditions. Stress distribution patterns and internal force diagrams identified critical vulnerabilities, thereby informing the development of a targeted structural retrofitting strategy. This approach balances technical intervention with cultural sensitivity, ensuring that reinforcement measures do not compromise the historical integrity of the structure.

The "Pen and Bullets" revitalization project demonstrates a progressive shift in cultural heritage restoration toward an immersive and participatory experience. By restoring lost architectural features and incorporating advanced VR and AR technologies, the project safeguards the Topulli House's cultural identity while actively engaging visitors. The precise rehabilitation of critical spatial typologies most notably the "oda e burrave" strengthens the vernacular architectural narrative, highlighting material authenticity and artisanal detail. Strict compliance with international restoration standards ensures interventions remain minimal, reversible, and faithful to the original fabric. This integrated approach, combining digital documentation, structural evaluation, and innovative museology within an adaptive reuse framework, offers a robust and replicable methodology for vernacular heritage preservation in Albania and similar contexts, promoting the sustainable conservation and revitalization of cultural landmarks.

In conclusion, the research advocates for a holistic digital heritage workflow in which BIM modeling, LiDAR scanning, and photogrammetry are not merely tools for documentation but foundational components in structural diagnosis, retrofit planning, and long-term conservation. This methodology provides a replicable model for similar interventions in heritage structures across the Balkans and other regions with comparable vernacular traditions and conservation challenges.

Beyond the case-specific findings, this study also informs wider policy and educational agendas. At the conservation policy level, it demonstrates the value of integrating digital workflows BIM, LiDAR, and photogrammetry into regulatory frameworks for heritage management and seismic risk mitigation. In Higher Education, it highlights how these tools strengthen digital literacy and analytical capacity, preparing future professionals to address heritage challenges with both technical rigor and cultural sensitivity.

REFERENCES

[1] Achille, C., Lombardini, N., & Tommasi, C. (2015). BIM & Cultural Heritage: compatibility tests in an archaeological site. *Building Information Modelling (BIM) in Design, Construction and Operations, Witpress*, 593-604.

[2] Antonio J. Loredo Conde, J. G.-S.-C. (2020). Use of BIM with Photogrammetry support in small construction projects. Case Study for Commercial Franchises. *Journal of Civil Engineering and Management, Volume 26 Issue 6: ISSN 1392-3730 / eISSN 1822-3605*, 513–523. doi:https://doi.org/10.3846/jcem.2020.12611

[3] Apollonio, F., Gaiani, M., & Sun, Z. (2012). BIM-based modeling and data enrichment of classical architectural buildings. *Scires-It, 2(2),*, 41-62.

[4] Brace, A. (1973). Veshtrim mbi Qendrat e Banuara Antike dhe Mesjetare ne Luginen e Drinosit. *Monumentet journal No.4*, pp. 103-139. Retrieved from https://iktk.gov.al/site/rreth-nesh/revista-monumentet-1982-1986/

[5] C. Palestini, A. Basso, L. Graziani,. (4–7 June 2018). Integrated Photogrammetric survey and BIM modelling for the protection of School Heritage, applications on a case study. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLII-2, 2018 ISPRS TC II*. Riva del Garda, Italy: Copernicus Publications. doi:https://doi.org/10.5194/isprs-archives-XLII-2-821-2018

[6] Cakaj, A. (2014). Architectural heritage of Berat and Gjirokastër. *Cultural and construction techniques. Proceedings of the Balkan Architectural Studies Conference*, (pp. 134-142).

[7] Carlos Rizo-Maestre, A. G.-A.-G. (2020). UAV + BIM: Incorporation of Photogrammetric Techniques in Architectural Projects with Building Information Modeling Versus Classical Work Processes. *MDPI Remote Sensing 2020, 12, 2329*. doi:10.3390/rs12142329

[8] Charleson, A., & Vesho, N. (2020). Structural engineering observations from the 26 November 2019 Mw 6.4 Albanian earthquake. *NZSEE 2020 Annual Conference*, 191-200. Retrieved from http://www.nzsee.org.nz/

[9] Dipasquale L., M. S. (2020). *From Vernacular to World Heritage., ISBN: 978-88-5518-292-8*. Firenze: Firenze University Press. doi:10.36253/978-88-5518-293-5

[10] Doempke, S. L. (2012). *Four Historic cities in the western balkans. Gjirokastra Conservation and development Organisation, Tirana.* Academy for Training and Technical Assistance EGNATIA EPIRUS Foundation. Retrieved from https://pdfcoffee.com/booken1-pdf-free.html

[11] Eurocode 5. (2008). *Design of timber structures | EN 1995-1-1 | Prepared by: Technical Committee CENITC250, BSI.* Brussels: CEN, European Committee for Standardization. doi:10.1002/9780470697818

[12] Eurocode 8, Pt.3. (2005). *Design of structures for earthquake resistance -Part 3: Assessment and retrofitting of buildings.* Brussels: CEN national Members.

[13] Georgopoulos, A., & Ioannidis, C. (2004, May 22-27). Photogrammetric and Surveying Methods for the Geometric Recording. *Workshop Book - Archaeological Surveys | WSA1 – Recording Methods* .

[14] Hamed, W., & El Antably, A. (2023, June 13). Knowledge-based HBIM for conservation: The case of Yahya al-Shabih mausoleum. *Digital Applications in Archaeology and Cultural Heritage e00278*. doi:https://doi.org/10.1016/j.daach.2023.e00278

[15] Jackson, R. H. (2021). *Gjirokastra: A City on Stone.* Tirana: OMB Series.

[16] Kjartansdóttir, I., Mordue, S., & Nowak, P. (2017). *Building information modelling BIM* (I ed.). (2. Civil Engineering Faculty of Warsaw University of Technology, Ed.) Warsaw: POLCEN Sp. z o.o. Retrieved from https://books.google.al/books/about/Building_information_modelling_BIM.html?id=6hz6twEACAAJ&redir_esc=y

[17] Lamprakos, M. (2010). *Conservation of Gjirokastra, Albania. On-site Review Report. edited by Aga Khan Award for Architecture.* Gjirokastra: 3990.ALB. Retrieved from https://www.academia.edu/67571326/Conservation_of_Gjirokastra

[18] Megahed, N. (2015). Towards a Theoretical Framework for HBIM Approach in Historic Preservation and Management. *International Journal of Architectural Research Archnet-IJAR, III*(9), 130-147.

[19] Merxhani, K. M. (2014). Construction materials used in the historic monuments, Gjirokaster. In *Monumentet (52)* (pp. 127-139). Tirana.

[20] Mezini, L., & Pojani, D. (2014). Defense, Identity, and Urban Form: The Extreme Case of Gjirokastra. *Planning Perspectives journal.* Retrieved from http://www.tandfonline.com/doi/abs/10.1080/02665433.2014.943267#.VB_WtmPDW4E

[21] Mustafaraj, E., Luga, E., Corradi, M., Borri, A., Muceku, Y., & Harkalli, A. (2021). Physical-Mechanical Properties of Stone Masonry of Gjirokastër, Albania. *Materials MDPI, Vol.14*. doi:https://doi.org/10.3390/ma14051127

[22] Petzold, F., & Donath, D. (2004). Digital Building surveying and Planning in existing Building. *1st ASCAAD International Conference, e-Design in Architecture KFUPM* (pp. 73-87). Dhahran, Saudi Arabia: KFUPM. Retrieved from https://papers.cumincad.org/cgi-bin/works/Show?ascaad2004_paper6

[23] Pocobelli, D., Boehm, J., Bryan, P., & Still, J. (2018). BIM for heritage science: a review. *Heritage Science, VI*(30), 1-15. doi:10.1186/s40494-018-0191-4

[24] Podesta, S. P. (2013). The wooden roof of Banesa e Skendulate in Gjirokastra, Albania: the role of the diagnostic test campaign in the structural safety evaluation. *Advanced Materials Research Vol. 778*, 911-918. doi:https://doi.org/10.4028/www.scientific.net/AMR.778.911

[25] Purini, F. (2000). *Comporre l'architettura | ISBN: 9788842061540.* Rome: EDITORI LATERZA. Retrieved from https://www.laterza.it/scheda-libro/?isbn=9788842061540

[26] Riza, E. (2015). Arkitektura dhe restaurimi i banesës së Zekatëve – Gjirokastër. *Monumentet Instituti i Monumenteve të Kulturës, Tirana, 53*, 125-142. Retrieved from https://biblio.iccrom.org/cgi-bin/koha/opac-detail.pl?biblionumber=12419

[27] Sulstarova, Aliaj, Peci, & Muco. (2004). *Catalogue of earthquakes in Albania with Ms=>4.5 for the period 8-2004.* Tirana: Seismological Institute Tirana.

[28] Thomo, P., Dollani, A., Caushi, E., & Nepravishta, F. (2009-2010). Konsolidimi dhe restaurimi i Kishes "Fjetja e Shen Marise" ne Zervat te Gjirokastres; *Monumentet, Vol.51* (Vol. 51). (I. o. Heritage, Ed.) Tirane: Onufri. Retrieved from https://iktk.gov.al/site/rreth-nesh/revista-monumentet-2008-2014, pg.17/

[29] Thomo, P., Merxhani, K., Mamani, E. (2011-2014). Materialet ndertimore ne monumentet historike, Gjirokaster; *Monumentet, Vol.52*. Tirane: Morava Press. Retrieved from https://iktk.gov.al/site/rreth-nesh/revista-monumentet-2008-2014, pg.127/

[30] Torresi, F. (2006). *Alla Scoperta della Citta' di Pietra, Il Piano di Recupero del Centro Storico di Gjirokastra.* Ascoli, Regione Marche: Acquaviva Picena - Italia. Retrieved from https://www.scribd.com/document/78088008/Gjirokastra

[31] Vesho, N. (2020, February). Seismic Performance of Traditional Stone houses in Dropulli region. *OMB Series, ISBN / 978-9928-4459-8-8, POLIS Press*, pp. 288-295. Retrieved from https://www.researchgate.net/publication/372236824_Seismic_Performance_of_Traditional_Stone_houses_in_Dropulli_region_OMB_Series_POLIS_Press

[32] Vesho, N. (2022). *Cultural Heritage Restoration in Tirana, period 1920-'40. BIM modeling, Seismic simulation and Theoretical interpretations.* University of Ferrara, Department of Architecture | UNIFE. Ferrara: POLIS Press & DA Unife. doi:10.13140/RG.2.2.13949.54245

[33] Vesho, N., & Nika, B. (2024). Analysis on the technology and structure of Vernacular Architecture. *Cultural Sustainable Tourism (CST) - 6th Edition* (pp. 60-61). Maia, Portugal: Edition IEREK. Retrieved from https://www.researchgate.net/publication/381002881_Analysis_on_the_technology_and_structure_of_Vernacular_Architecture_The_case_of_Gjirokastra_through_site_works_and_BIM_Cultural_Sustainable_Tourism_CST_-_6th_Edition_IEREK

[34] Vesho, N., & Nika, B. (2025). Analysis on the technology and structure of Vernacular Architecture. The case of Gjirokastra through site works and BIM. *Cultural Heritage- Based Sustainable Tourism Approaches | Series ISSN: 2522-8714* . Perugia: Springer Nature Switzerland AG 2025. Retrieved from https://link.springer.com/book/9783031932748

[35] Vesho, N., & Nika, B. (2025). Vernacular architecture and the state of cultural heritage in Gjirokastra through restoration camps. Analysis and Technology application. *6th International Conference on Innovative Academic Studies, Volume: 6, ISBN 978-625-5900-01-2.* Konya, Turkey: All Sciences Academy.

[36] Vesho, N., Guri, M., & Sava, A. (2023, October 29). The use of numerical models within the BIM environment, for the issue of Cultural heritage restoration. Buildings designed until 1940 in Albania. (J. P. Editor-in-chief: Paulo J S Cruz, Ed.) Architecture Structures and Construction, Published by Springer Nature. Online ISSN: 2730-9894, Print ISSN: 2730-9886, III(03), 02-18. doi:10.1007/s44150-023-00106-8

[37] Zhang, Y., & Deng, J. (2023). Application of Mobile LiDAR in Heritage BIM Modeling. Journal of Cultural Heritage Management and Sustainable Development. doi:https://doi.org/10.1108/JCHMSD-10-2022-0160

THE ROLE OF MOOCS AND OPEN EDUCATIONAL RESOURCES IN HIGHER EDUCATION

Applications in Teaching Medicine and Laboratory Science

Dorina **MINXURI**

LOGOS University College
dorina.minxuri@kulogos.edu.al

Abstract

Massive Open Online Courses (MOOCs) and Open Educational Resources (OER) have emerged as transformative tools in higher education. For fields like medicine and laboratory sciences, where constant innovation and updated protocols are essential, MOOCs and OERs represent an invaluable complement to traditional teaching. These resources enhance accessibility, flexibility, and student engagement, while bridging gaps between theory and clinical practice This paper explores the role of MOOCs and OERs in higher education, with a particular focus on teaching laboratory sciences, and examines how these resources can support student-centered learning. A comparative analysis is provided between traditional lecture-based instruction and student-centered approaches supported by OER and MOOCs. Findings suggest that OER-supported teaching improves knowledge retention, practical skills, and clinical reasoning.

Keywords: Laboratory science, student-centered learning, MOOC, OER

ABOUT THE AUTHOR

DORINA MINXURI

Dorina Minxuri is a full-time lecturer at the Department of Health Sciences and Social Welfare, Faculty of Applied Sciences, at LOGOS University College, where she has been teaching since 2015. She earned her Master of Science degree in General Medicine at the University of Medicine in Tirana in 2010, and later pursued a four-year postgraduate specialization in Endocrinology and Diabetology (2011–2015). During this period, she also taught as a part-time lecturer at both the Faculty of Medicine in Tirana (Physiology) and Albanian University. In 2019, she began her doctoral studies at the Catholic University "Our Lady of Good Counsel", focusing her research on thyroid gland pathologies, a field in which she continues to develop her expertise. Since 2017, she has also been practicing as an endocrinologist in a private outpatient service, where she is dedicated to the follow-up and treatment of individuals with endocrine disorders. Dr. Minxuri is the author and co-author of several scientific articles in the field of medicine and has presented her work at numerous national and international congresses and workshops in medicine and endocrinology. She is an active member of several professional organizations, including the Endocrine Society (ENDO Society), the International Society of Endocrinology (ISE), and the Healthcare & Biological Sciences Research Association (HBSRA).

INTRODUCTION

MOOCs are large-scale online courses open to learners worldwide, often offered free of charge or at low cost by universities and educational platforms (Yuan & Powell, 2013). OERs, on the other hand, are freely available teaching and learning resources such as textbooks, case studies, or videos that can be adapted and reused (Hilton, 2016). Together, MOOCs and OERs have emerged as vital innovations, enabling instructors to integrate updated content, case-based learning, and multimedia into teaching (Wiley *et al.,* 2014, Bonk *et al.,* 2018).

Applications in Medicine and Laboratory Science

Higher education, particularly in medical and laboratory sciences, faces the challenge of preparing students not only with theoretical knowledge but also with practical competencies and decision-making skills applicable to real-world clinical environments. Traditional teaching methods, often centered on didactic lectures, are increasingly considered insufficient for preparing students to navigate modern health care challenges (Laurillard, 2012). For pathophysiology and laboratory sciences, OER provide access to up-to-date diagnostic protocols, visual demonstrations of testing procedures, and interactive cases that mirror patient scenarios. MOOCs allow for flexible and scalable teaching, while offering certification in specialized laboratory competencies such as hematology, immunology, microbiology, and laboratory automation. By integrating *clinical case studies* from open resources, students are exposed to real-world patient problems and learn how to link theory to practice. *Demonstrative videos* - often simple, visual, and engaging - help explain complex mechanisms such as hormonal feedback loops or the interpretation of diagnostic results. Moreover, the inclusion of *updated laboratory testing protocols and technological guidelines* ensures that students remain current with professional standards.

MOOCs allow for flexible and scalable teaching and provide opportunities for quick and attractive learning outside of the classroom, while offering certification in specialized laboratory competencies such as hematology, immunology, microbiology, and laboratory automation. For instance, recommending short, free courses on platforms like Coursera, edX, or FutureLearn can enhance students' understanding of these concepts and not only reinforce knowledge but also cultivate lifelong learning skills (Hew & Cheung, 2014).

Student-Centered Learning and Critical Thinking

Traditional didactic teaching often leaves little space for students to actively engage, analyze, and make decisions. MOOCs and OERs play a critical role in this pedagogy by shifting responsibility for learning toward students. Instead of passively receiving information, students engage with case materials, interpret data, and make diagnostic decisions. This active learning model mirrors clinical practice, where health professionals must analyze patient data, consider alternatives, and act on evidence.

By using MOOCs and OERs, students can explore different pathways of knowledge at their own pace, revisiting difficult concepts as needed. This not only improves

comprehension but also fosters independent problem-solving and critical reasoning skills (Liu *et al.,* 2016). Ultimately, student-centered use of MOOCs and OERs helps prepare learners for the realities of laboratory medicine, where uncertainty and decision-making are everyday challenges.

Accredited MOOCs for Laboratory Competencies

One of the most promising applications of MOOCs in laboratory sciences is the creation *of accredited, institution-based online courses* for specific competencies. Universities can develop short, targeted MOOCs designed to certify laboratory skills, thus bridging the gap between theoretical teaching and workplace readiness. (Open WHO 2023) Examples include:

- *Hematological Testing:* peripheral smear interpretation, use of automated analyzers, and hematology case analysis.
- *Advanced Immunology Techniques:* ELISA interpretation, flow cytometry, and immunofluorescence microscopy.
- *Microbiology in Practice:* culture methods, antibiotic susceptibility testing, and biosafety protocols.
- *Laboratory Automation:* operation of automated analyzers, data integration, and quality control.

Such micro-MOOCs, if accredited and tied to continuing education credits, could grant students official certificates of competence, thereby improving employability and aligning education with labor market demands (Jansen & Konings, 2017). For medical schools, this innovation positions the institution at the forefront of professional training in laboratory sciences.

AIM AND OBJECTIVES

The aim of this study was to compare the effectiveness of traditional teaching methods with the integration of Open Educational Resources (OER) and Massive Open Online Courses (MOOCs) in the field of clinical laboratory education. The study seeks to determine whether OER and MOOCs can enhance students' learning outcomes, engagement, and ability to apply knowledge in clinical contexts when compared to traditional lecture-based instruction. Importantly, the student cohort involved had already experienced an intensive shift toward online education during the COVID-19 pandemic. This prior adaptation to virtual classrooms, digital platforms, and self-directed learning created a level of familiarity that facilitated the continued use of MOOCs and OER. As a result, implementing these methods was not perceived as a disruptive change but rather as a natural extension of the students' learning environment.

More specifically, the study aimed to:

- Evaluate differences in student performance and competency acquisition between those enrolled in traditional classroom-based teaching and those using MOOCs and OER materials (e.g., videos, clinical case resources, updated laboratory testing protocols).

- Assess students' preferences and satisfaction with MOOCs and OER as supplementary or primary tools for laboratory education, with a focus on courses such as immunological testing, hematology, microbiology, and laboratory automation.
- Explore the advantages and limitations of MOOCs and OER in preparing laboratory students for real-world professional settings, emphasizing decision-making, analytical skills, and patient-centered practice.

By comparing these two approaches, the study intended to provide evidence on whether MOOCs and OER can complement or partially replace traditional methods in higher education for laboratory sciences, ultimately helping institutions design more flexible, accessible, and practice-oriented curricula.

MATERIALS AND METHODS

This study was conducted over two consecutive academic years 2023-2024 and 2024-2025 in the medical laboratory students. Students were organized into two Groups:

- Group A A (n = 48): Students enrolled in the second and third academic years (2023-2024 period) received teaching exclusively through traditional, in-person laboratory sessions and lectures.
- Cohort B (n = 45): Students enrolled in the second and third academic years (2024-2025 period) received teaching that integrated Massive Open Online Courses (MOOCs) and Open Educational Resources (OERs), besides the traditional teaching. These materials were delivered primarily through the Microsoft Teams platform, which had already been adopted during the COVID-19 pandemic for online lectures, communication, and sharing of protocols. Using existing online platforms ensured students were familiar with digital tools, so no additional training was needed.

Interventions

During the OER/MOOC phase Microsoft Teams was used primarily to share online materials. Demonstrative videos, interactive cases, and updated protocols were made accessible asynchronously. Up to 20% of lecture contact hours - specifically those covering laboratory technique protocols (e.g., ELISA/CLIA principles, flow cytometry basics, PCR. RIA) - were delivered via MOOCs/OER and not re-lectured in class. An online forum was available for clarification. Completion of final tests and demonstration of laboratory skills (based on existing curricula) was mandatory and contributed to practical evaluation.

Measurement instruments:

- *Theoretical knowledge:* multiple-choice questions (MCQs) based on the standard curriculum and prior exams.
- *Practical competencies:* laboratory skill assessment using standardized procedures derived from validated laboratory protocols.

- *Student satisfaction and motivation:* assessed via structured questionnaires focusing on ease of use, accessibility, and perceived effectiveness of online platforms.
- *Time spent for teaching and learning* evaluated in both phases.

The online topics covered *exactly* the same learning outcomes the lecture would have; only the *mode* changes. While the examinations and competency checklists were aligned with existing curricula and laboratory protocols (thus reflecting validated standards of the program), the satisfaction questionnaire was developed for this study and was not piloted beforehand. However, its content drew from prior student experiences with Microsoft Teams during the COVID-19 pandemic, providing contextual grounding.

ETHICAL CONSIDERATIONS

This study involved undergraduate medical laboratory students as part of standard curriculum activities. Participation in the surveys and online modules (MOOCs and OER) was voluntary, and students were informed about the objectives and use of data. Ethical considerations were addressed by discussing the materials in class and obtaining students' verbal consent; no personal data were collected, and participation did not affect academic evaluation. During the OER/MOOC phase, Microsoft Teams was used primarily as a platform to share videos, laboratory protocols, and open educational materials, rather than for real-time instruction. This approach minimized any disruption to standard teaching while allowing students to access materials asynchronously. Given that the study involved routine educational activities and non-invasive assessments, ethical risks were minimal. This design was chosen for reasons of practicality and feasibility, as it allowed integration of digital resources within the real teaching environment without disrupting the curriculum.

RESULTS

This study compared two cohorts of undergraduate students in clinical laboratory sciences: Group A (n = 48), who received traditional teaching (lectures with PowerPoint, textbook study, and in-class laboratory demonstrations), and Group B (n = 45), who received instruction through MOOCs and OER-based learning modules integrated in traditional curriculum. Importantly, students in Group B were already adapted to online learning methods during the COVID-19 pandemic, which facilitated the implementation of this teaching model.

Knowledge Improvement

- Group A (traditional): mean improvement in test scores = 18%
- Group B (MOOCs + OER): mean improvement = 32%
- The difference between groups was statistically significant (t-test, $p < 0.01$).

Applied Competencies

- Group B performed significantly better in case-based clinical reasoning questions (mean score difference: +14%, $p < 0.05$).
- Group B also showed higher accuracy in hematological tests and immunological assays, attributed to prior exposure to demonstrative videos and structured OER protocols.

Hands-On Practice

- Group A benefited from real-time improvisation and spontaneous problem-solving during laboratory practice, which was limited in Group B due to the online format.

Engagement and Motivation (Survey Results)

- 85% of Group B students reported feeling more prepared for real-world clinical practice compared to 55% of Group A.
- Group B valued the comprehensive, easily accessible content, with the ability to revisit modules at their own pace without extending teacher contact hours.
- Teaching/learning time was shorter in Group B compared to Group A, suggesting higher efficiency.

Challenges with MOOCs and OER

- 32% of Group B students reported difficulties maintaining focus and consistency without the structured schedule of in-person classes.
- Lack of immediate interaction with instructors was frequently cited, as students could not ask spontaneous questions or receive real-time clarification.
- Extended screen time was perceived as tiring by several Group B students, in contrast to the more interactive classroom and laboratory sessions in Group A.

Table 1. Summary of Comparison between Traditional Teaching and MOOCs+OER

Aspect	**Traditional Lecture**	**MOOCs + OER**
Knowledge retention	Moderate	High
Clinical reasoning	Limited	Strong
Practical skills	Average	Above average
Engagement	Passive	Active, student-centered
Certification opportunities	None	Available (MOOC certificates)
Efficiency of information Delivery	Medium	High
Real-time communication	High	None
Emotional engagement	Low	High
Hands-on improvisation	High	None
Screen fatigue	High	Limited

DISCUSSION AND LIMITATIONS

The findings of this study demonstrate that the use of MOOCs and OER-based instruction led to significantly greater learning gains compared to only traditional teaching methods in undergraduate clinical laboratory sciences. Students in Group B (MOOCs + OER) achieved a 32% mean improvement in test scores, nearly 1.8-fold higher than the 18% mean improvement observed in Group A (traditional teaching). This difference was statistically significant (t-test, $p < 0.01$), indicating that OER-based learning contributed to more effective knowledge acquisition.

In addition to theoretical knowledge, Group B showed superior performance in applied competencies. Specifically, case-based clinical reasoning scores were on average 14% higher than those of Group A ($p < 0.05$). These results suggest that structured online modules, enriched with demonstrative videos and standardized protocols, facilitated deeper understanding and practical readiness.

However, several limitations must be acknowledged:

- First, the study design compared two consecutive student cohorts. This introduces a potential cohort effect bias, as differences in performance and satisfaction may not be attributable solely to the teaching method but also to natural variations between groups. Randomized controlled trials or matched cohort designs would provide stronger evidence, but in this context, randomization was not feasible. The chosen design was primarily driven by practicality and access within the educational setting.
- Second, while the knowledge and competency assessments were based on existing exams aligned with the curriculum, and the checklists followed established laboratory protocols (supporting content validity), the student satisfaction questionnaire was not piloted prior to use. Nonetheless, its feasibility was supported by the fact that students had already become accustomed to interacting with online platforms during the COVID-19 pandemic, which served as an indirect pre-testing of their ability to engage with such instruments.
- Third, the COVID-19 context itself may have influenced results. Students in the experimental group had prior exposure to online learning platforms (e.g., Microsoft Teams), which were widely used during the pandemic for lectures, communication, and dissemination of educational materials. This prior adaptation likely reduced barriers to the implementation of MOOCs and OERs. While this may represent a bias favoring the intervention group, it also reflects a realistic teaching context, as online learning platforms remain part of routine academic practice post-pandemic.
- Finally, the sample size was modest (Group A: 48, Group B: 45), and findings may not be generalizable to other institutions or disciplines.

Despite these limitations, the study highlights the feasibility and educational value of integrating MOOCs and OERs into medical education, particularly in contexts where digital platforms are already embedded in teaching practices.

The findings support global evidence that MOOCs and OER enhance knowledge

acquisition, practical skills, and self-directed learning (Hew & Cheung, 2014; Hollands & Tirthali, 2015).. Traditional lectures, while useful for foundational theory, fail to fully engage students or connect knowledge to clinical practice (Bonk *et al.,* 2018). By contrast, OER-supported instruction encourages self-directed learning, critical thinking, and adaptability.

In laboratory sciences, access to free online courses allows students to rehearse protocols before practice, reducing errors and building confidence. The introduction of accredited MOOCs for specific laboratory skills represents a significant opportunity. For example, courses in hematological testing, advanced immunology techniques, microbiology in practice, and laboratory automation can both enrich the curriculum and provide students with career-relevant certifications (Yuan & Powell, 2013).

A major advantage of OER is flexibility: students can review updated protocols for immunoassays, molecular diagnostics, and automation systems at their own pace. Furthermore, institutions can offer certificate-based MOOCs in hematological testing, advanced immunology, microbiology practice, or lab automation, enhancing employability and lifelong learning.

Furthermore, teaching faculty can benefit from MOOCs designed for educators, focusing on student-centered learning, competency-based approaches, and case-based teaching strategies. These help align higher education with real-world health care demands, ensuring students are not only knowledgeable but also capable of decision-making in patient-centered contexts.

However, challenges remain. MOOCs often lack personal interaction, spontaneity, and the "emotional dimension" of classroom learning (Veletsianos & Shepherdson, 2016). While students generally appreciated the accessibility, flexibility, and clarity of OER and MOOCs, several drawbacks were also reported. Unlike traditional teaching, MOOCs and OER lack immediate interaction with instructors, making it difficult for students to ask spontaneous questions or receive instant clarification. Students missed the dynamics of face-to-face classes such as improvisation, humor, and motivating classroom interactions which often make learning more memorable. Completion of MOOCs requires a high level of self-discipline. Some students reported difficulties in maintaining focus and consistency without the structured schedule of in-person classes. While video demonstrations and virtual labs provided good visualization, they could not fully replicate the tactile and improvisational aspects of working in a real laboratory setting. Extended screen time for online learning was perceived as tiring by some students, especially compared with more interactive classroom and laboratory sessions.

CONCLUSIONS

MOOCs and OER are powerful tools in higher education, particularly in the field of clinical laboratory sciences where rapid advances in technology and diagnostic protocols demand updated knowledge and flexible learning models. Unlike traditional lectures, which rely on textbooks, PowerPoint presentations, and in-class demonstrations, MOOCs and OER provide students with highly concentrated, visually comprehensive content that can be revisited multiple times. This not only accelerates the learning process but also empowers

students to take greater responsibility for their own progress. (Rodriguez, C. O. 2012) (Daniel, J. 2012). Faculties of Education and Centers for Teaching and Learning play a central role in designing syllabi for MOOCs, since their mission is to foster inclusive, research-informed teaching practices that place student learning at the core (Nathanaili, 2024).

When integrated with traditional methods, MOOCs and OER create a blended approach that combines the efficiency of digital delivery with the depth of classroom-based interactions. In clinical laboratory training, this integration can help students acquire both the technical competencies (such as hematology, immunology, biochemistry protocols, microbiology practice, and automation systems) and the clinical reasoning skills needed for professional practice. In addition, institutions that recognize and accredit specific MOOCs with certificates - such as those focused on hematological tests, advanced immunology techniques, or laboratory automation - strengthen the bridge between open learning and professional recognition, making these tools more attractive for career development. (Conole, G. 2013; Downes, S. 2012).

Nevertheless, challenges remain. Students often report that MOOCs require higher self-motivation and discipline, as the absence of real-time communication, emotional interaction, and spontaneous improvisation can make the learning process feel less engaging than traditional classroom settings. (Lane, A. 2009). Elements such as humor, informal discussions, or the supportive presence of peers and instructors are often lost in online learning environments. These limitations, however, can be mitigated through blended learning models that combine the flexibility of MOOCs with mentorship, scheduled discussions, and interactive feedback sessions.

Looking forward, the most effective strategy for higher education institutions—especially in clinical laboratory sciences—will be to continue developing specialized MOOCs and OER modules that not only provide theoretical foundations but also simulate laboratory practice through virtual labs, case studies, and problem-solving tasks. (Sangrà *et al.,* 2013). By accrediting these modules and aligning them with professional competencies, universities can ensure that students graduate not only with knowledge but also with recognized skills directly applicable to the workforce. In this way, MOOCs and OER can evolve from supplementary tools into integral components of a modern, student-centered, and professionally relevant education system. (Siemens G.,2013)

Based on these observations, several recommendations emerge:

- Incorporate MOOCs and OERs into Core Teaching: Faculty should actively adopt case studies, open videos, and digital resources to enrich pathophysiology and lab science curricula.
- Encourage Lifelong Learning: By recommending short, free MOOCs, students gain tools for independent and continuous professional development.
- Promote Student-Centered Learning: Courses should be redesigned to use MOOCs and OERs as catalysts for decision-making, data analysis, and problem-solving.
- Develop Faculty Training: Institutions should train educators in leveraging digital resources for student-centered pedagogy.

- Create Accredited Micro-MOOCs: Universities should develop certified online courses for specific laboratory competencies, improving employability and linking education with real-world practice.

REFERENCES

Bonk, C. J., Lee, M. M., Reeves, T. C., & Reynolds, T. H. (2018). *MOOCs and open education around the world.* Routledge.

Conole, G. (2013). Designing for learning in an open world. Springer.

Downes, S. (2012). Connectivism and connective knowledge: Essays on meaning and learning networks. National Research Council Canada.

Daniel, J. (2012). Making sense of MOOCs: Musings in a maze of myth, paradox and possibility. *Journal of Interactive Media in Education, 2012*(3).

FutureLearn. (2023). *Clinical biochemistry and laboratory medicine*. https://www.futurelearn.com/

Hew, K. F., & Cheung, W. S. (2014). Students' and instructors' use of massive open online courses (MOOCs): Motivations and challenges. *Educational Research Review, 12*, 45–58. https://doi.org/10.1016/j.edurev.2014.05.001

Hilton, J. (2016). Open educational resources and college textbook choices: A review of research on efficacy and perceptions. *Educational Technology Research and Development, 64*(4), 573–590.

Hollands, F. M., & Tirthali, D. (2014). MOOCs: Expectations and reality. *Full report*. Center for Benefit-Cost Studies of Hollands, F. M., & Tirthali, D. (2015). MOOCs in higher education: Institutional goals and paths forward. *Contemporary Educational Technology, 6*(1), 3–15.

Lane, A. (2009). The impact of openness on bridging educational digital divides. *The International Review of Research in Open and Distributed Learning, 10*(5), 1–12.

Laurillard, D. (2016). The educational problem that MOOCs could solve: Professional development for teachers of disadvantaged students. *Research in Learning Technology, 24*(1), 29369. https://doi.org/10.3402/rlt.v24.29369

Liu, M., Kang, J., Cao, M., Lim, M., Ko, Y., & Divina, F. (2016). Examining learners' perspective of taking a MOOC: Reasons, excitement, and perception of usefulness. *Educational Media International, 53*(3), 199–213.

Nathanaili, V. (2024). *The use of MOOCs in university teaching and learning: Case study constructing a MOOC course for teaching physics in higher education.* In Proceedings of the International Scientific Conference "Living in a Technological Era" – Ditët e Studimeve Shqiptare XI / Albanian Studies Days / Journées d'études albanaises (pp. 232–243). European University of Tirana (UET). Published October 2024, Tiranë, Albania.

OpenWHO. (2023). *Immunology and laboratory biosafety training modules*. World Health Organization. https://openwho.org/

Reich, J. (2015). Rebooting MOOC research. *Science, 347*(6217), 34–35.

Rodriguez, C. O. (2012). MOOCs and the AI-Stanford like courses: Two successful and distinct course formats for massive open online courses. *European Journal of Open, Distance and E-Learning, 15*(2), 1–13.

Sangrà, A., González-Sanmamed, M., & Anderson, T. (2013). Meta-analysis of the research on the integration of open and distance learning in higher education. *The International Review of Research in Open and Distributed Learning, 14*(5), 133–160.

Siemens, G. (2013). Massive open online courses: Innovation in education? In R. McGreal, W. Kinuthia, & S. Marshall (Eds.), *Open educational resources: Innovation, research and practice* (pp. 5–16). Commonwealth of Learning.

Veletsianos, G., & Shepherdson, P. (2016). A systematic analysis and synthesis of the empirical MOOC literature published in 2013–2015. *The International Review of Research in Open and Distributed Learning, 17*(2), 198–221.

Wiley, D., Bliss, T. J., & McEwen, M. (2014). Open educational resources: A review of the literature. In J. M. Spector et al. (Eds.), *Handbook of research on educational communications and technology* (pp. 781–789). Springer.

Yuan, L., & Powell, S. (2013). MOOCs and open education: Implications for higher education. *JISC CETIS White Paper*.

Zawacki-Richter, O., Bozkurt, A., Alturki, U., & Aldraiweesh, A. (2018). What research says about MOOCs: An explorative content analysis. *The International Review of Research in Open and Distributed Learning, 19*(1), 242–259.

Zhang, J., & Dang, Y. (2020). Integrating MOOCs and traditional learning: A blended learning model in medical education. *Medical Education Online, 25*(1), 1711235. https://doi.org/10.1080/10872981.2019.1711235

LANGUAGE TECHNOLOGIES AND DIGITAL HUMANITIES FOR LOW-RESOURCE LANGUAGES AND COMMUNITIES

Arbana **KADRIU***
Lejla **ABAZI-BEXHETI**

South East European University, Tetovo, North Macedonia
Corresponding Author*: a.kadriu@seeu.edu.mk

Abstract

This paper studies how language technologies and digital humanities can work together, especially for languages with few digital resources. Many computational tools help humanities research, but they mainly work for major languages like English. This creates problems for smaller language communities who cannot use these digital tools. We examine the main challenges: lack of digital texts, limited technology infrastructure, and biased computer systems. The paper suggests solutions like transfer learning (using knowledge from major languages), community participation in projects, and collaborative annotation methods. We propose better practices for digital humanities that respect local cultures and build local skills. Our findings show that helping with low-resource languages needs both better technology and changes in how researchers work with communities. This research helps make digital humanities fairer and gives practical advice for working with underrepresented languages and cultures.

Keywords: digital humanities, language technologies, low-resource languages, natural language processing, cultural heritage, community-centered design

ABOUT THE AUTHORS

LEJLA ABAZI-BEXHETI

Prof. Dr. Lejla Abazi-Bexheti is a Full Professor of Computer Science at South East European University (Tetovo, North Macedonia), working across university quality assurance, digital governance/open data, and AI in education. She leads EU-funded Erasmus+/CBHE collaborations, coordinating multi-country consortia, MoUs, and capacity-building. At SEEU she teaches Programming and Human–Computer Interaction, develops curricula, and mentors PhD students. Her research focuses on e-learning and on open data/e-government usability, interoperability, and policy - translating findings into institutional practice and enhancing teaching and learning through digital tools.

ARBANA KADRIU

Arbana Kadriu is a Full Professor of Computer Science at the Faculty of Contemporary Sciences and Technologies, South East European University (SEEU) in Tetovo, North Macedonia. She earned her PhD in Computer Science from Ss. Cyril and Methodius University, Skopje (2008), specializing in natural language processing and information retrieval. Her research spans AI and machine learning, software engineering, web information retrieval, social network analysis, and e-learning, with a growing focus on speech technologies for low-resource languages. Prof. Kadriu teaches across undergraduate, master's, and doctoral programs, organized into three clusters: Data & Intelligence, Software & the Web, and Research & Methods. She has supervised numerous master's and PhD theses in areas such as data mining–driven decision support, Albanian speech recognition, authorship analysis, and automatic music generation. Prof. Kadriu has authored 70+ publications across journals and international conferences (IEEE, Springer, PLOS ONE, and others) and contributes to international projects, including Erasmus+ initiatives on digital humanities and quality assurance, as well as COST actions on language technology and language learning.

INTRODUCTION

The digital revolution has fundamentally transformed the landscape of humanities research, creating unprecedented opportunities for computational analysis, preservation, and dissemination of cultural heritage. Digital Humanities (DH) has emerged as a vibrant interdisciplinary field that bridges traditional humanistic study with cutting-edge computational methodologies. At the heart of this transformation lies the integration of language technologies, encompassing natural language processing (NLP), speech recognition, machine translation, and computational linguistics, which have become indispensable tools for scholars working with textual and linguistic data.

The promise of these technologies extends far beyond well-resourced languages and institutions. For communities speaking low-resource languages, working with endangered dialects, or operating within limited technological infrastructures, the democratizing potential of digital humanities and language technologies offers pathways to preserve, analyse, and revitalize cultural heritage that might otherwise remain inaccessible to computational analysis. This paper examines the intersection of language technologies and digital humanities, with particular attention to the challenges and opportunities presented by low-resource linguistic contexts.

As we navigate this digital transformation, questions of equity, accessibility, and technological sovereignty become vital. How can we ensure that the benefits of computational humanities extend to all linguistic communities? What methodological innovations are needed to address the unique challenges faced by under-resourced languages and regions? This exploration seeks to address these critical questions while charting pathways for more inclusive digital humanities practices.

RELATED WORK

Foundations of Computational Humanities

The integration of computational methods into humanities research has deep historical roots, beginning with early concordance projects and evolving into sophisticated analytical frameworks. Moretti's (2005) concept of *distant reading* revolutionized literary analysis by proposing computational approaches to understanding large-scale patterns in literary history. This was further developed by Jockers (2013), who introduced macro analysis as a method for examining literary corpora at scale, utilizing topic modelling, stylometry, and network analysis to uncover hidden patterns in cultural production.

The theoretical foundations of digital humanities have been extensively examined by scholars such as Hockey (2004), who traced the evolution from humanities computing to digital humanities, and Ramsay (2011), who argued for the transformative potential of computational methods in humanistic study. *Debates in the Digital Humanities* convenes prominent scholars to probe theories, methods, and practices and to map the field's possibilities and tensions (Gold, 2012). More recently, Underwood (2019) has demonstrated how machine learning can be applied to historical questions, showing the potential for algorithmic approaches to complement traditional humanistic methods.

Language Technologies for Humanities Applications

The application of NLP to humanities research has grown exponentially with advances in machine learning. Piper (2018) explored the use of computational methods for literary analysis, demonstrating how distant reading techniques can reveal patterns invisible to close reading. Similarly, Da (2019) examined the epistemological implications of computational literary studies, raising important questions about interpretation and meaning making in digital contexts.

The development of multilingual models like BERT (Devlin *et al.,* 2019) and XLM-R (Conneau *et al.,* 2020) has begun to address the needs of non-English humanities research, though significant gaps remain for truly low-resource languages. Recent developments in neural language models have opened new possibilities for humanities research. Aftan & Shah (2023) provided a comprehensive survey of BERT and its applications, many of which have direct relevance to humanities scholarship.

Low-Resource Language Technologies

The challenge of developing effective NLP tools for low-resource languages has attracted significant attention from the computational linguistics community. Hedderich et al. (2020) provided a comprehensive survey of approaches for low-resource NLP, including transfer learning, data augmentation, and cross-lingual methods. These techniques have shown promises for extending language technologies to previously underserved linguistic communities.

Multilingual initiatives such as the Universal Dependencies project (Nivre *et al.,* 2020) have created standardized linguistic resources across hundreds of languages, providing crucial infrastructure for low-resource NLP development. Similarly, projects like AmericasNLP (Mager *et al.,* 2021) have focused specifically on indigenous languages of the Americas, demonstrating both the potential and the challenges of applying modern NLP techniques to endangered languages.

The work of Bird (2020) on "Decolonising Speech and Language Technology" has highlighted the importance of community involvement and ethical considerations in developing language technologies for marginalized communities. This perspective emphasizes the need for participatory approaches that prioritize community needs and values over purely technical considerations.

Digital Infrastructure and Humanities Research

The development of robust digital infrastructures has been crucial for enabling large-scale humanities research. Projects like DARIAH (Digital Research Infrastructure for the Arts and Humanities) and CLARIN (Common Language Resources and Technology Infrastructure) have created Pan-European networks that facilitate the sharing of tools, resources, and expertise (Edmond *et al.,* 2020).

The Text Encoding Initiative (TEI) has provided standardized mark-up schemes that enable interoperability and long-term preservation of digital texts (Burnard & Bauman, 2007). These standards have been particularly important for ensuring that digitization efforts can be sustained and accessed across different platforms and time periods.

DIGITAL HUMANITIES: CONCEPTS AND EVOLUTION

Defining Digital Humanities

Digital Humanities encompasses a broad spectrum of computational approaches to humanistic inquiry, ranging from simple digitization projects to sophisticated analytical frameworks that leverage artificial intelligence and machine learning. At its core, DH represents a methodological shift that embraces computation as a legitimate form of scholarly activity, challenging traditional boundaries between technical and humanistic knowledge.

The field has evolved through several distinct phases. The first generation, often called "humanities computing," focused primarily on digitization and basic text analysis tools. The second generation expanded to include visualization, database design, and multimedia scholarship. The current third generation increasingly integrates machine learning, artificial intelligence, and big data approaches with traditional humanistic methods.

This evolution has been accompanied by ongoing debates about the nature and goals of digital humanities. Some scholars advocate for DH as a transformative methodology that can reveal new insights impossible through traditional approaches. Others view it as a set of tools that complement but do not replace conventional humanistic methods. Regardless of these theoretical differences, the practical impact of DH on scholarship has been profound, enabling new forms of collaboration, publication, and knowledge creation.

Core Methodologies in Digital Humanities

Contemporary DH employs a diverse array of methodological approaches, each suited to different types of research questions and data. Text mining and natural language processing allow scholars to analyze large corpora for patterns in language use, thematic development, and stylistic evolution. Topic modeling, in particular, has become a popular technique for discovering latent themes in document collections, though it requires careful interpretation and domain expertise to yield meaningful results (Kadriu & Abazi-Bexheti, 2015).

Network analysis has proven valuable for understanding relationships between authors, texts, characters, and ideas (Kadriu, 2013). By representing these relationships as graphs, scholars can apply mathematical techniques to identify influential nodes, detect communities, and trace the flow of ideas across time and space. This approach has been particularly fruitful in literary studies, where it has revealed new insights into literary influence and cultural transmission.

Geographic Information Systems (GIS) and spatial analysis have opened new avenues for humanities research by enabling scholars to analyze the spatial dimensions of cultural phenomena. Digital mapping projects can reveal patterns in the distribution of cultural practices, the movement of people and ideas, and the relationship between geography and cultural production.

Challenges in Digital Humanities Methodology

Despite its promise, DH faces significant methodological challenges that require ongoing attention from the scholarly community. The interpretation of computational results often requires deep domain expertise and careful consideration of algorithmic limitations.

Machine learning models, in particular, can produce results that appear meaningful but may reflect biases in training data or limitations in the underlying algorithms.

The reproducibility crisis that affects many scientific fields also impacts digital humanities. Computational analyses often rely on complex pipelines of data processing and analysis that can be difficult to reproduce, especially when proprietary tools or datasets are involved. The field has begun to address these challenges through initiatives promoting open science practices, including data sharing, code publication, and containerized computational environments.

Another significant challenge involves the integration of quantitative and qualitative methods. While computational approaches can identify patterns and correlations in large datasets, the interpretation of these patterns often requires traditional humanistic methods of close reading, contextual analysis, and cultural interpretation. Developing frameworks that effectively combine these approaches remains an ongoing area of methodological innovation.

LANGUAGE TECHNOLOGIES: FOUNDATIONS AND HUMANITIES APPLICATIONS

Evolution of Language Technologies

Language technologies have undergone remarkable evolution over the past several decades, driven by advances in computational power, algorithm development, and data availability. The field has progressed through several distinct paradigms, each offering new capabilities for processing and understanding human language.

The rule-based era of the 1960s-1980s relied on hand-crafted linguistic rules and knowledge bases. While limited in scope and coverage, these systems provided precise control over language processing and produced interpretable results. Many early humanities computing projects relied on these approaches for concordance generation and basic text analysis.

The statistical revolution of the 1990s-2000s introduced probabilistic methods that could learn patterns from data rather than relying solely on human-defined rules. This paradigm shift enabled the development of more robust and scalable systems, including the first practical machine translation systems and information retrieval engines that could handle the messy, ambiguous nature of real-world text.

The current neural era, beginning in the 2010s and accelerating with the introduction of transformer architectures, has achieved unprecedented performance on many language processing tasks. These systems can capture subtle semantic relationships, generate human-like text, and transfer knowledge across languages and domains in ways that were previously impossible.

Core Technologies and Their Humanities Applications

Natural Language Processing encompasses a wide range of techniques that are directly applicable to humanities research. *Named Entity Recognition* (NER) can automatically identify people, places, organizations, and other entities in historical texts, enabling large-scale prosopographical analysis and the construction of knowledge graphs that map relationships between historical actors.

Part-of-speech tagging and *syntactic parsing* provide insights into linguistic structure and evolution, supporting research in historical linguistics and stylometry. These techniques have been used to study authorship attribution (Misini *et al.,* 2022). genre classification, and the evolution of literary style across time periods and cultural contexts.

Sentiment analysis and *opinion mining* offer tools for understanding emotional content and subjective attitudes in texts. These approaches have been applied to study public opinion in historical newspapers, emotional landscapes in literature, and the reception of cultural works across different periods and audiences.

Machine translation, while imperfect, provides valuable assistance for humanities scholars working with multilingual sources. Recent advances in neural machine translation have improved quality significantly, though challenges remain for historical languages and specialized domains.

Emerging Technologies and Future Directions

Recent developments in large language models represent a potential paradigm shift for humanities applications. Models like GPT-5 demonstrate remarkable capabilities in text generation, summarization, and question answering that could transform how scholars interact with textual sources. However, these models also raise important questions about accuracy, bias, and the nature of understanding that require careful consideration from the humanities community.

Multimodal approaches that combine text with images, audio, and video offer new possibilities for analysing cultural artefacts holistically. Computer vision techniques can analyse visual elements in manuscripts, paintings, and other cultural objects, while speech recognition and analysis can process oral histories and recorded performances.

LOW-RESOURCE LANGUAGES AND DIGITAL EQUITY

Defining Low-Resource Contexts

The concept of "low-resource" in computational linguistics encompasses multiple dimensions beyond simple data availability. While the most obvious characteristic is limited digital text corpora, low-resource contexts also involve insufficient computational infrastructure, limited technical expertise, and often complex sociolinguistic situations involving language endangerment, multilingualism, and cultural sensitivity.

Languages may be considered low-resource for various reasons. Some languages have large speaker populations but limited digital presence due to historical, economic, or political factors. Others are genuinely endangered, with small and often aging speaker communities. Still others exist in complex multilingual environments where speakers may prefer to use more dominant languages for written communication, limiting the development of digital resources.

The low-resource designation also applies to specific domains or time periods within otherwise well-resourced languages. Historical texts, specialized genres, or regional dialects may lack sufficient computational resources even for major languages. This highlights the multidimensional nature of the low-resource problem and the need for flexible, adaptive approaches.

Technical Challenges for Low-Resource NLP

Developing effective language technologies for low-resource contexts presents numerous technical challenges that require innovative solutions. The most fundamental issue is data scarcity: most modern NLP techniques require large amounts of training data, which may not exist for low-resource languages. This creates a problem where the lack of digital resources prevents the development of tools that could help create more resources.

Transfer learning has emerged as a promising approach to address data scarcity (Rista & Kadriu, 2021). By leveraging knowledge learned from high-resource languages, models can be adapted to work with limited data in target languages. Cross-lingual word embedding, multilingual neural models, and zero-shot transfer techniques have shown significant promise, though they often require careful adaptation to work effectively in truly low-resource scenarios.

Another significant challenge involves the mismatch between linguistic structures. Many NLP tools are designed with the assumptions of English or other well-studied languages in mind. Languages with complex morphology, non-concatenative morphological processes, or unusual syntactic structures may require fundamentally different approaches that current tools cannot accommodate.

The evaluation of low-resource NLP systems also presents unique challenges. Standard evaluation metrics and benchmarks may not be appropriate for languages with different linguistic properties or cultural contexts. Community-based evaluation approaches that involve native speakers and cultural experts are often necessary but can be difficult to organize and sustain.

COLLABORATIVE ANNOTATION AND KNOWLEDGE CREATION

Adaptive Digitization Strategies

Traditional digitization approaches developed for well-resourced institutions and languages often prove inadequate for low-resource contexts. Innovative methodologies are needed that can work with limited infrastructure, non-standard materials, and community-specific requirements.

Crowdsourcing and community involvement in digitization can dramatically expand capacity while building local engagement with digital heritage projects. Platforms like Transcribe Bentham (Causer & Wallace, 2012) and DIY History (Lewis, 2019) have demonstrated how volunteer contributors can be organized to transcribe and annotate historical documents, though successful community engagement requires careful attention to training, quality control, and motivation.

Mobile-first digitization strategies recognize that smartphones may be the primary or only computing devices available in many low-resource contexts. Mobile applications for document capture, audio recording, and basic annotation can enable community-based digitization efforts that would be impossible with traditional desktop-based approaches. Low-cost digitization solutions using readily available technology can make digitization accessible to communities and institutions with limited resources. Techniques using smartphones,

digital cameras, and simple lighting setups can produce acceptable quality digital copies of documents and artifacts at a fraction of the cost of professional scanning equipment.

Collaborative Annotation and Knowledge Creation

Annotation—the process of adding interpretive metadata to digital objects—is crucial for enabling computational analysis but can be resource-intensive for low-resource projects. Collaborative approaches that distribute annotation efforts across multiple contributors can make large-scale annotation feasible while building community engagement.

Gaming approaches to annotation, often called "games with a purpose," can motivate volunteer contributors while ensuring quality through redundancy and validation mechanisms. Crowdsourcing projects have demonstrated the potential for crowdsourced scientific discovery, and similar approaches are being adapted for humanities applications.

Standards-based annotation using frameworks like the Text Encoding Initiative (TEI) or the International Image Interoperability Framework (IIIF) ensures that annotation efforts can be shared and reused across projects and institutions. While these standards may require adaptation for specific cultural contexts, they provide important foundations for interoperability and long-term preservation.

Computational Methods for Sparse Data

Traditional computational approaches often assume abundant data, but low-resource contexts require methods that can work effectively with limited materials. Few-shot learning techniques, which can learn from just a few examples, show promise for tasks like text classification and named entity recognition in low-resource languages.

Unsupervised and semi-supervised methods can leverage unlabeled data, which is often more readily available than carefully annotated datasets. Techniques like word embeddings, topic modeling, and clustering can provide insights even when labeled training data is scarce. Cross-lingual transfer methods can adapt models trained on high-resource languages to work with related low-resource languages (Kadriu, 2019). While this approach requires careful attention to linguistic differences, it can provide a starting point for developing language-specific tools and resources.

FUTURE DIRECTIONS AND EMERGING OPPORTUNITIES

Technological Innovations on the Horizon

Rapid advances in artificial intelligence and machine learning continue to create new possibilities for low-resource digital humanities. Large language models, despite their current limitations with low-resource languages, show promise for few-shot learning applications that could dramatically reduce data requirements for many tasks.

Multimodal AI systems that can process text, images, audio, and video simultaneously offer new possibilities for comprehensive cultural analysis. These systems could enable more holistic approaches to digital humanities that reflect the multimedia nature of cultural expression and transmission.

Federated learning approaches could enable collaborative model development across multiple institutions while preserving data privacy and community control. This could be particularly valuable for low-resource contexts where data sharing may be culturally or legally restricted. Advances in automatic speech recognition and neural machine translation continue to improve capabilities for low-resource languages. While significant challenges remain, the trajectory of improvement suggests that these technologies will become increasingly viable for humanities applications in coming years.

Methodological Developments

The integration of traditional humanities methods with computational approaches continues to evolve, creating new hybrid methodologies that leverage the strengths of both approaches. These developments are particularly important for low-resource contexts where computational tools may need to be supplemented by traditional scholarly expertise.

Participatory action research methodologies are being adapted for digital humanities contexts, emphasizing community involvement not just in data collection but in research design, analysis, and dissemination. These approaches can help ensure that research serves community interests while building local research capacity. Mixed-methods approaches that combine quantitative computational analysis with qualitative ethnographic research are proving valuable for understanding the cultural contexts and implications of digital humanities work. These approaches are particularly important when working with communities whose worldviews and knowledge systems may differ significantly from academic norms. Critical digital humanities frameworks that interrogate the assumptions and implications of computational methods are becoming increasingly important as these methods are applied in diverse cultural contexts. These frameworks help ensure that technology serves humanistic values rather than replacing them with purely technical considerations.

CONCLUSION

Language technologies and digital humanities offer new opportunities for small language communities but also create challenges. Computer tools are becoming more powerful, which could help more communities access advanced research methods. However, this requires attention to fairness, cultural respect, and building local skills.

The technical problems of creating language tools for small languages are big but solvable. New methods like transfer learning and multilingual models help address the lack of digital texts for minority languages. But technology alone is not enough - successful projects need deep community engagement, respect for local customs, and commitment to building local capacity. The new methods from low-resource digital humanities work benefit everyone. Community-based research approaches offer important lessons for all digital humanities researchers and challenge old ideas about expertise and research benefits. Making projects sustainable depends on technology infrastructure, training people, and finding funding. Different approaches work for different situations, and projects must adapt to local needs. This adaptation teaches us about how technology and culture work together.

Looking ahead, AI improvements will create more applications while making them easier to use. Growing recognition of indigenous rights will require better approaches to data control. Better global connections will create opportunities but also challenges about cultural identity. The goal is not just extending existing methods to new places but transforming the field through working with diverse communities. This can make digital humanities richer for everyone while ensuring computational analysis benefits all communities, not just well-resourced ones. The path forward is challenging but promising for creating a more inclusive future for humanities scholarship.

REFERENCES

Aftan, S., & Shah, H. (2023). A survey on bert and its applications. In 2023 20th Learning and Technology Conference (L&T) (pp. 161-166). IEEE.

Bird, S. (2020). Decolonising speech and language technology. In 28th International Conference on Computational Linguistics, COLING 2020 (pp. 3504-3519). Association for Computational Linguistics (ACL).

Burnard, L., & Bauman, S. (2008). TEI P5: Guidelines for electronic text encoding and interchange (Vol. 5). Oxford. http://www. tei-c. org/Guidelines.

Causer, T., & Wallace, V. (2012). Building a volunteer community: results and findings from Transcribe Bentham. *Digital Humanities Quarterly*, *6*(2).

Conneau, A., Khandelwal, K., Goyal, N., Chaudhary, V., Wenzek, G., Guzmán, F., ... & Stoyanov, V. (2019). Unsupervised cross-lingual representation learning at scale. *arXiv preprint arXiv:1911.02116*.

Da, N. Z. (2019). The computational case against computational literary studies. *Critical Inquiry*, 45(3), 601-639.

Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019, June). Bert: Pre-training of deep bidirectional transformers for language understanding. In *Proceedings of the 2019 conference of the North American chapter of the association for computational linguistics: human language technologies, volume 1 (long and short papers)* (pp. 4171-4186).

Edmond, J., Tasovac, T., Fischer, F., & Romary, L. (2020). 9. Springing the Floor for a Different Kind of Dance: Building DARIAH as a Twenty-First-Century Research Infrastructure for the Arts and Humanities.

Gold, M. K. (Ed.). (2012). *Debates in the digital humanities*. U of Minnesota Press.

Hedderich, M. A., Lange, L., Adel, H., Strötgen, J., & Klakow, D. (2020). A survey on recent approaches for natural language processing in low-resource scenarios. *arXiv preprint arXiv:2010.12309*.

Hockey, S. (2004). The history of humanities computing. A companion to digital humanities, 1-19.

Jockers, M. L. (2013). *Macroanalysis: Digital methods and literary history*. University of Illinois Press.

Kadriu, A., & Abazi, L. Topic Modelling for Education in Computing. In *International Conference on e-Learning* (Vol. 15, p. 91).

Kadriu, A. (2013, June). Discovering value in academic social networks: A case study in ResearchGate. In *Proceedings of the ITI 2013 35th international conference on information technology interfaces* (pp. 57-62). IEEE.

Kadriu, A. (2019). Building an annotated corpus for the Albanian language using bilingual projections and regular expressions. *International Journal of Knowledge Engineering and Data Mining*, *6*(2), 105-121.

Lewis, D. (2019). History and perspective on DIY closed looping. *Journal of diabetes science and technology*, *13*(4), 790-793.

Mager, M., Oncevay, A., Ebrahimi, A., Ortega, J., Gonzales, A. R., Fan, A., ... & von der Wense, K. (2021, June). Findings of the AmericasNLP 2021 shared task on open machine translation for indigenous languages of the Americas. In *Proceedings of the First Workshop on Natural Language Processing for Indigenous Languages of the Americas* (pp. 202-217).

Misini, A., Kadriu, A., & Canhasi, E. (2022). A survey on authorship analysis tasks and techniques. *Seeu Review*, *17*(2), 153-167.

Moretti, F. (2005). *Graphs, Maps, Trees: Abstract Models for a Literary History*. Verso.

Nivre, J., De Marneffe, M. C., Ginter, F., Hajič, J., Manning, C. D., Pyysalo, S., ... & Zeman, D. (2020). Universal Dependencies v2: An evergrowing multilingual treebank collection. arXiv preprint arXiv:2004.10643.

Piper, A. (2019). *Enumerations: Data and Literary Study*. University of Chicago Press.

Ramsay, S. (2011). *Reading Machines: Toward an Algorithmic Criticism*. University of Illinois Press.

Rista, A., & Kadriu, A. (2021, September). End-to-end speech recognition model based on deep learning for Albanian. In *2021 44th International Convention on Information, Communication and Electronic Technology (MIPRO)* (pp. 442-446). IEEE.

Underwood, T. (2019). *Distant Horizons: Digital Evidence and Literary Change*. University of Chicago Press.

Vania, C., Grivas, A., & Lopez, A. (2018). What do character-level models learn about morphology? The case of dependency parsing. arXiv preprint arXiv:1808.09180.

THE COGNITIVE-DIGITAL TURN IN HIGHER EDUCATION

A Longitudinal Analysis of AI Engagement in an Architectural Design Studio

Fulvio **PAPADHOPULLI***
Megi **TAFAJ**

POLIS University, Tirana, Albania
Corresponding Author*: fulvio_papadhopulli@universitetipolis.edu.al

Abstract

As artificial intelligence (AI) gradually becomes an integral part of higher education, its integration with creative disciplines such as architectural design studios, raises pedagogical, ethical and epistemological questions. This study presents a semester-long empirical investigation concerning AI adoption among 37 architecture students in a third-year speculative design studio. Rather than mandating its use, the course positioned generative systems as optional epistemic actors in order to monitor the students' approaches in embracing or resisting a relationship with generative systems. The evaluation system was constructed via a weekly interaction matrix that cross-referenced AI integration scores (0-3 scale, constant) with performance metrics (0-2/10 scale, variable) per assignment. This kind of systematic tracking gave us a baseline to perform longitudinal typology analysis, as a diagnostic survey to map students' attitudes in relation to AI adoption. Five behavioural archetypes emerged throughout the academic term: Digital Emergers, Strategic Adopters, Cautious Integrators, Disengaged, and Resistant; revealing varied temporal patterns of integration. The research highlights the non-linear evolution of digital abilities shaped by contextual alignment, cognitive load and dialogical scaffolding. It also recognizes infrastructural disparities and the ethical uncertainties of AI co-authorship as significant obstacles to fair and substantive integration. The findings support a paradigm change from instructing digital tools as mere software, to guiding students in adaptive reasoning, ethical judgment, and the strategic engagement with AI as collaborators. This research offers a replicable methodology for documenting the temporal progression of digital competence development and establishes a comprehensive framework for educators aiming to incorporate AI into design-based learning environments with critical insight and pedagogical awareness.

Keywords: AI Integration in Design Education, Digital Competence Trajectories, Architectural Pedagogy, Interaction Matrix, Temporal Behavioural Typologies

ABOUT THE AUTHORS

FULVIO PAPADHOPULLI

Fulvio Papadhopulli is an architect, lecturer, and computational designer whose work operates at the intersection of urban intelligence and algorithmic form. He is co-founder of 'k4rkalecat', a design practice developing workflows that intertwine artificial intelligence with parametric methodologies, moving from façade-level experimentation to territorial-scale reasoning. At POLIS University, he leads computational design studios (from CAAD III to Studio & Theory III) that employ speculative briefs to test evidence-based design against real urban frictions and fabrication constraints. He is currently pursuing a joint doctoral degree at POLIS University and the University of Ferrara, where his research introduced the concept of "Quantum Mimicry" as continuation to urban design epistemology. This work develops generative algorithms calibrated for regulatory compliance and environmental performance, validated through predictive modelling. His trajectory includes recognition as a Young Talent finalist from the EU Mies Awards 2023 and a nomination for the RIBA President's Silver Medal Awards in London in 2024. Through POLIS's Innovation Factory, Fulvio has incubated start-ups translating kinetic systems and energy harvesting into deployable prototypes, winning both a national grant and Tirana Inc. in 2024. His public engagements include an AI-focused keynote at TIFF24 and advanced training on machine-learning-driven adaptive geometries. Across practice, research, and teaching, his work positions design as inference: reading the city as a dataset of entangled constraints and rewriting its latent affordances into spatial form.

MEGI TAFAJ

Megi Tafaj is a young emerging architect whose professional trajectory combines architectural design, urban planning, and academic engagement. She holds an Integrated Master's in Architecture from POLIS University, complemented by an Erasmus+ exchange at the Anhalt University of Applied Sciences in Germany, where she broadened her expertise in architecture, facility management, and geoinformation systems. Her professional experience spans both private practice and institutional collaborations. She has contributed to urban-scale projects such as the Parma Masterplan and the Napoli Train Station Masterplan, as well as dual international concept design competitions for public institution clusters and mixed-use developments. In architectural practice, she has been part of the design teams at "ZEN+ Project & Partners" and "Metropolis", where she engaged in residential building design, interior design, and facade development for institutional buildings. Currently serving as an Assistant Lecturer at POLIS University, she supports both teaching and research activities, preparing course materials and mentoring students. Her technical proficiency includes advanced 3D modelling, rendering, and graphic communication tools, while her collaborative ethos and adaptability position her as a confident contributor to multidisciplinary teams.

INTRODUCTION

The accelerating pace of artificial intelligence's (AI) integration in higher education (HE) is changing how learning processes are understood, carried out, and assessed across disciplines. Although this integration is often viewed through the lens of efficiency or tool augmentation, an increasing amount of literature emphasizes the importance of examining the pedagogical and epistemological implications of these technologies, especially in creative and design-based fields (Oxman, 2017; Carpo, 2017). Simultaneously, frameworks such as DigCompEdu (Redecker, 2017) and DigComp 2.2 (Vuorikari *et al.,* 2022) have endeavored to formalize digital competencies among educators and learners by offering structured pathways for acquiring and assessing skills. Contrary to the open-ended, speculative and iterative nature of architectural design education, these frameworks frequently assume linear progressions and standardized contexts.

Design studios, as educational settings, are marked by significant epistemic uncertainty and personalized project pathways. Students must traverse intricate spatial, narrative, and technological dimensions while integrating personal expression with contextual awareness. In this context, the implementation of generative AI tools, ranging from large language models to image-based synthesizers, transforms not only the production process but also the conceptual framework through which design ideas are conceived and enhanced (Picon, 2021). This prompts significant inquiries into the temporal progression of AI adoption, the manner in which students engage with these tools, and the relationship between such interactions and performance, creativity, or critical reasoning.

Despite the growing institutional interest in digital integration, there is a lack of understanding of how students interact with AI tools in architectural studios, particularly when these tools are introduced not as mandatory requirements but as optional collaborators. Recent syntheses (Bond *et al.,* 2024; Crompton & Burke, 2023) argue how AI-in-HE research remains methodologically narrow offering limited models that trace engagement over time. Two main shortcomings can be highlighted in current research. They either quantify tool usage in static terms or focus on isolated learning outcomes, which are detached from broader temporal and behavioural dynamics. Empirical models that approach AI engagement as a temporally distributed phenomenon, shaped by factors such as trust, timing, familiarity, and evolving cognitive strategies, are often not included. (Cai et al. 2023)

This study addresses the identified gap by conducting an in-depth case analysis of a third-year architectural studio course. It explores how students develop and diversify their digital competencies when AI tools are offered as optional resources rather than imposed. This engagement is perceived as an incremental behaviour that evolves through situated interactions, self-initiated experimentation, and context-specific choices. Rather than adopting a binary perspective of adoption versus rejection, the research offers a more nuanced understanding of how students actively shape, question, or withhold digital agency within the unfolding logic of their design work.

To address this research question, the study introduces a new evaluative framework

correlating weekly AI usage patterns with design performance metrics. This generates a time-sensitive interaction matrix. The model identifies behavioural typologies that emerge over the course of a semester. These typologies reflect the various ways in which students interact with, oppose, or redefine the role of AI in their design cognition processes. The intuitive nature of AI systems, which are designed to minimize barriers to entry, requires educators to rethink their role. Instead of providing direct tool instruction, educators must now determine when, why, and how such tools should be used in design thinking (Pangrazio & Selwyn, 2019).

2- METHODOLOGY

2.1 Studio Context and Experimental Framework

This research was conducted as part of the academic work developed within the course "Studio and Theory of Architecture 3B", part of the Integrated Master's Program in Architecture at POLIS University during the Spring semester of 2025. The course structure was conceived as a speculative design studio entitled "*Psychogenic (deals with conscious & subconscious understandings) Exo-formalism (ἔξω – outside; meaning it goes "beyond" form): A Manifesto for the Unbuilt",* which explicitly embedded AI as a potential design collaborator without enforcing its use. The course initially conceptualized AI not as an external technology, but as a shaping epistemic presence within the cognitive processes of design.

The pedagogical framework was structured around 3 core lecture series (from now on referred to as "Chapters" or "CH"), respectively: (CH-1) 'Meaning of Form & Primordial Conception of Form's Structure'; (CH-2) 'Architectural Narratives for Contextual Paradigms & Global Crises'; (CH-3) 'Innovative Architectural Approaches'. The theoretical grounding was further enriched through chosen literatures from which each student selected one text to inform and guide their semester-long work. The grading system incorporated weekly bonus incentives for digital experimentation, originality and exceptional performance.

2.2 Syllabus Architecture and Grading Structure

Over the course of the 13-week semester, the curriculum was organized into the three thematic design chapters mentioned above, each concluding with a critical Pin-Up or jury review. Weekly assignments were evaluated on a domain from 2 to 10 points, while the final presentation was appointed at a value of 30 points (Table 1). The distribution of weekly grading weights was intentionally varied to monitor the escalating complexity of the design challenges. To visualize the cognitive complexity in the course design, a dual-axis progression diagram was created (Fig. 1). This diagram aligns the formal assessment intensity based on weekly grading system, with a heuristically defined conceptual cognitive load curve, scored on a normalized scale from 1 to 10. (Fig. 1, Table 2).

Table 1 Course's Semestral Content Map

Week	Title / Focus	Assessment Task	Weight (points = %)	Evaluation Criteria
Week 1	Speculative Design / Theoretical Positioning	Abstract + Literature review from a list of Precedents + Initial Sketches + Diagram Concepts (6 HQ Diagrams)	5	Theoretical depth, clarity of diagrams, engagement with readings
Week 2	System-Thinking Logics in Architecture / Diagrammatic Expansion	System & Subsystem Diagrams + Diagram Hybridization (2 HQ Diagrams) + Analytical Texts	5	Logic of systems, visual layering, clarity of hybrid logic
Week 3	Phenomenology & Emotions / AI Integration	Expressive Written Narrative + Sequential Diagrams + Media Experiments (GIF/video)	5	Emotional integration, narrative coherence, speculative clarity
Week 4	PIN-UP 1: CHAPTER 1 Review	Revised Chapter 1 Portfolio + Experimental Model + 1 Final Narrative Image (Render/ Collage)	10	Conceptual synthesis, visual articulation, model intelligence
Week 5	Understanding Territories (Context assignment)	Context Analysis (Album/3D) + Extracted Data Analysis + Typological Proposal	3	Contextual depth, data visualization, typological reasoning
Week 6	Contextual Superposition / Speculative Cone à Positioning	Adaptation of Narrative + Initial Massing + Bubble Diagram (Functional Logic)	2	Narrative evolution, functional clarity, site response
Week 7	PIN-UP 2: CHAPTER 2 Review	Revised Chapter 2 + 1 Contextualized Narrative Image + 3D Printed Model	10	Narrative-Context fusion, technical accuracy, coherence
Week 8	Geometrical Rationalization	Drawings: Articulation Geometry x Study Integration + first drafts of Plans/ Sections/3D cohesion	5	Geometric articulation, tectonic clarity, logical accuracy
Week 9	Architectural Rationalization	Updated Plans/Sections/ Models + Case Study Integration	5	Architectural consistency, case-reflection, functionality
Week 10	Structural Systems & Assemblies	Structural Layering + Subsystem Diagrams + Structural Visualization	5	Structural expression, clarity of layering, construction

Week 11	Materiality & Detail Integration	Material Logic Definition + Preliminary Detailing + AI-enhanced Systems	5	Material-system integration, smart strategy usage
Week 12	PIN-UP 3: CHAPTER 3 Review	Revised Chapter 3 + 1 Technical Drawing Image + A1 Panel + Project Coherence	10	Visual-technical precision, synthesis, narrative coherence
Week 13	FINALS	Final Printed Portfolio + A0 Panel + Final Section Physical Model + PPTX + Optional Short Video (BONUS Points)	30	Overall quality, completeness, presentation professionalism
	TOTAL		100	Overall Semestral Performance (OSP)

Table 2 Final Scoring Weights Breakdown per Chapters

Category	**Weight (%)**
CHAPTER 1 Deliverables (W1–W4) – CYAN (Higher AI use expectations)	25
CHAPTER 2 Deliverables (W5–W7) – BLUE (Medium AI use expectations)	15
CHAPTER 3 Deliverables (W8–W12) – MAGENTA (Low AI use expectations)	30
Final Review + Presentation (W13) – (Medium AI use expectations)	30

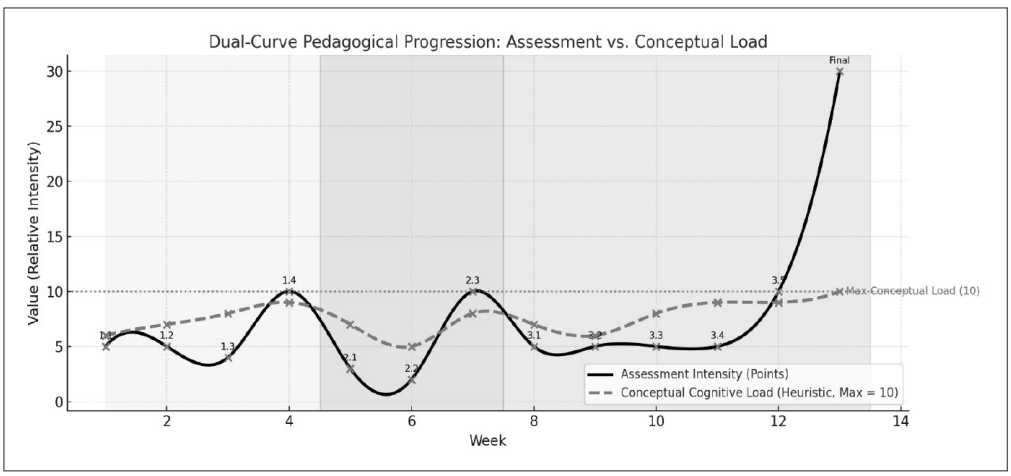


Fig. 1 Dual-Curve Pedagogical Progression: Assessment vs. Conceptual Load

NOTE: INSTRUCTOR CALIBRATION AND EVALUATION CONSISTENCY

In order to mitigate the effects of grading subjectivity particularly during milestone reviews (Pin-Ups 1–3 and Finals), the course incorporated a multi-rater approach. Each of these critical assessments was attended by invited guest professors from POLIS University, who collaboratively reviewed students' outputs with the main studio tutors. This panel-based approach has the advantage of facilitating inter-rater calibration and helping to counterbalance potential biases associated with single-instructor evaluation. In an effort to incorporate a variety of perspectives, the process included triangulated feedback.

2.3 - Preliminary Diagnostic: Mapping Digital Competencies and AI Perceptions

A total of 37 students enrolled in the Studio and Theory of Architecture 3B – SS25 course, constituting the full cohort. As this was the teaching team's first academic interaction with the group, establishing a baseline understanding of students' digital competencies was crucial. This ensured that any pedagogical introduction of emerging technologies that also included generative AI tool, would be correlated with the actual digital capabilities and thresholds of the class.

To support this objective, a diagnostic survey was administered via Google Form at the start of the semester. Students were asked to self-assess their confidence and prior experience across five stages of architectural project development:

- Concept and early-phase ideation (sketching, diagramming, conceptual generation)
- 3D modelling (parametric, sculptural or BIM-based development)
- 2D drafting and detailing (technical articulation)
- Analytical reasoning and simulation (environmental, structural, spatial)
- Visualization and rendering (AI-based, photorealistic, collage or atmospheric)

The purpose of this diagnostic was not evaluative, but rather calibrative. Its findings played a key role in adjusting the pace, intensity and framing of emerging tool exposure during weekly seminars and individual consultations. Although the detailed results are not included in this publication due to scope constraints, the diagnostic process constituted a foundational component of the course's methodological design, particularly in a course that relied on differentiated scaffolding of digital competencies.

Additionally, the same diagnostic included a qualitative question: *"What's your opinion about the role of AI integration in architecture and related fields? How do you approach it?"*

This generated 37 open responses, which were later classified into five distinct thematic categories reflecting the diversity of student perspectives (Fig. 2):

- A: Pro-AI – Enthusiastic endorsement of AI as a creative and productivity-enhancing tool
- B: Tool with Caution – Measured adoption strategies focused on intentional, controlled use

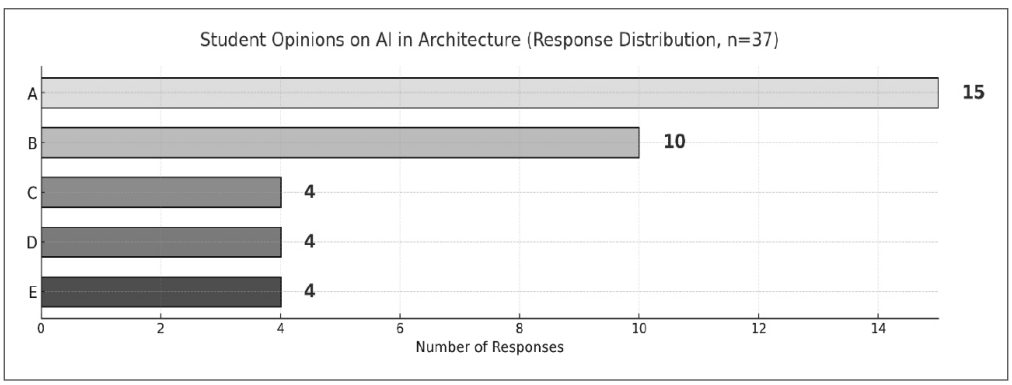


Fig. 2 Distribution Diagram as a **latent interpretive framework** when further analysing tool adoption behaviour, performance rhythms, and design trajectories across the semester.

- C: Critical Concerns – Ethical reservations regarding authorship, homogenization, and overreliance
- D: Disengaged – Ambivalence, minimal interaction, or unclear positioning
- E: Anti-AI – Rejection or distrust based on philosophical, creative, or experiential grounds

Exemplary responses include:

"AI speeds up repetitive tasks and frees more time for conceptual thinking. It's like having a digital assistant." (Category A)

"I'm open to AI, but prefer to do the initial ideation myself. It becomes useful after you know your own direction." (Category B)

"My worry is that too much AI use can lead to projects looking the same. We must protect cultural and stylistic diversity." (Category C)

"No comment, really. It is what it is…" (Category D)

"NO!" (Category E)

NOTE: DATA ETHICS & GDPR COMPLIANCE

All diagnostic and evaluative data, both qualitative and quantitative, were collected in accordance with data governance protocols and GDPR regulations. The students were informed in advance that their responses and scores would be anonymized for research purposes and would not influence individual grading outcomes. The digital platforms Google Forms and Google Classroom were solely utilized for educational purposes, with raw data being exclusively accessible to the teaching team.

2.4 - Weekly Evaluation Heatmap: Per-Column Visual Normalization

A weekly grading matrix was developed to evaluate and visually represent student performance during the semester, encompassing data from 37 students across 13 weeks of assessment. Although raw scores were preserved, the colour representation in the heatmap was generated using column-wise normalization. For visual representation, the grading column for each week was normalized independently between its minimum and maximum scores. This approach provided a consistent visual depiction of comparative performance on a weekly basis, while also ensuring that variations in weekly grading's weight value, did not distort the perception of intra-week performance. (Fig. 3)

The resulting heatmap utilizes a colour gradient ranging from dark blue to magenta, with dark blue indicating the lowest-scoring student for that specific week and magenta representing the highest performer within the same evaluative column. This per-week domain calibration enables high-resolution visual analysis by highlighting temporal patterns of student engagement while identifying performance clusters across the semester.

2.5 - AI Integration Scoring System

Parallelly, each week, AI integration was rated on an ordinal scale from 0 to 3 based on insights from tutor-student dialogue during weekly consultations. These sessions were followed by the submission of design evidence through Google Classroom. Although emerging AI technologies like ComfyUI, Midjourney, ChatGPT, RunwayML, LookX or

Grading Matrix (G):

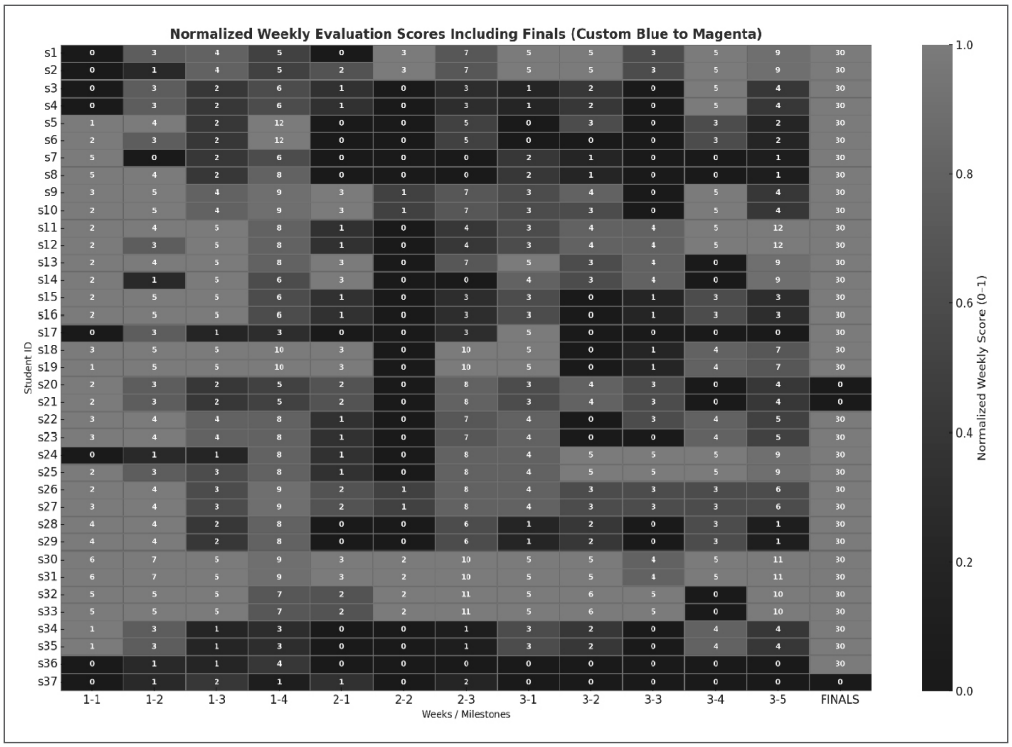


Fig. 3 Weekly Evaluation Scores – Normalized Weekly Heatmap (37 rows (students) × 13 columns (weeks) Contains semestral grading scores (0-2/30 points)

Sora were introduced to students, they were under no obligation to use them. It is important to emphasize that the following matrix was developed for research analysis and did not affect the overall weekly grading for any of the students.

AI Adoption Matrix (A):

37 rows (students) × 13 columns (weeks)
Contains weekly AI integration scores (0–3 score)

The weekly AI integration scores were assigned according to the following criteria:

- 0 = No AI use observed or declared.
- 1 = Experimental/partial use, with minor visual or textual influence.
- 2 = Moderate tool integration, visibly affecting form, narrative, or graphics.
- 3 = Proficient and coherent co-authorship, where AI tools were critically and clearly integrated into the design logic.

This system generated a 37 × 13 matrix of AI scores across all students and weeks. (Fig. 4)

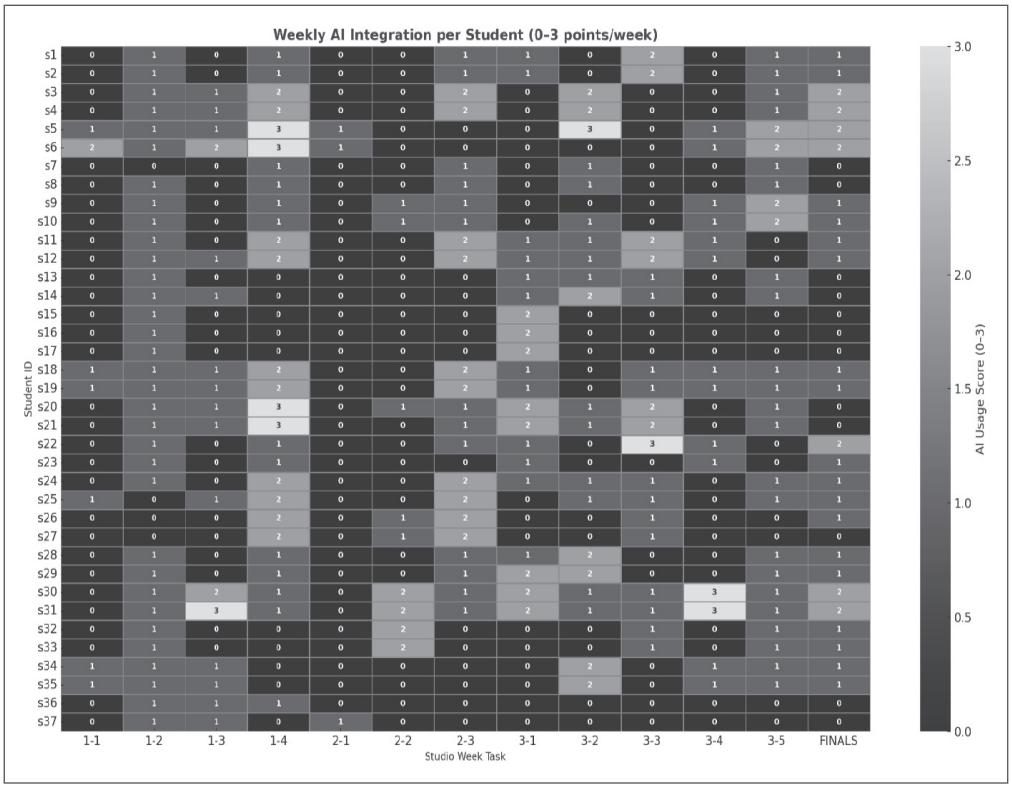


Fig. 4 Weekly AI Integration Scores – Normalized Weekly Heatmap

2.6 - Heatmap Dataset Construction of Interaction Matrix

The Interaction Matrix is designed to measure the synchronous intensity between AI tool usage and design performance per student per week. The formula is:

$$M_{i,j} = \sqrt{A_{i,j} \cdot G_{i,j}}$$

Where: Ai,j = AI integration score for student *i* in week *j* (0–3 scale); Gi,j = Grade for student *i* in week *j* (typically 0–2/10, task-specific); Mi,j = Interaction score [bounded between 0 and √(max_A × max_G)]

$$M'_{i,j} = \sqrt{A'_{i,j} \cdot G'_{i,j}} = \sqrt{\frac{A_{i,j}}{\max_j A_{*,j}} \cdot \frac{G_{i,j}}{\max_j G_{*,j}}}$$

In the normalized version (for cross-week comparison), each variable is normalized per column (week):

This ensures that variations in assignment weights or AI variability across weeks don't distort the result, so all values fall between 0 and 1. We use the geometric (rather than arithmetic) mean because it penalizes high variance between the AI and grade components, thereby rewarding synchronous intensity (both high or both low) and down-weighting mismatched pairs.

The matrix is sorted top-down according to cumulative engagement, from the highest to the lowest overall use of AI in relation to performance. A colour gradient ranging from magenta (0.0) to cyan (1.0) gives intuitive comparison of behavioural typologies and

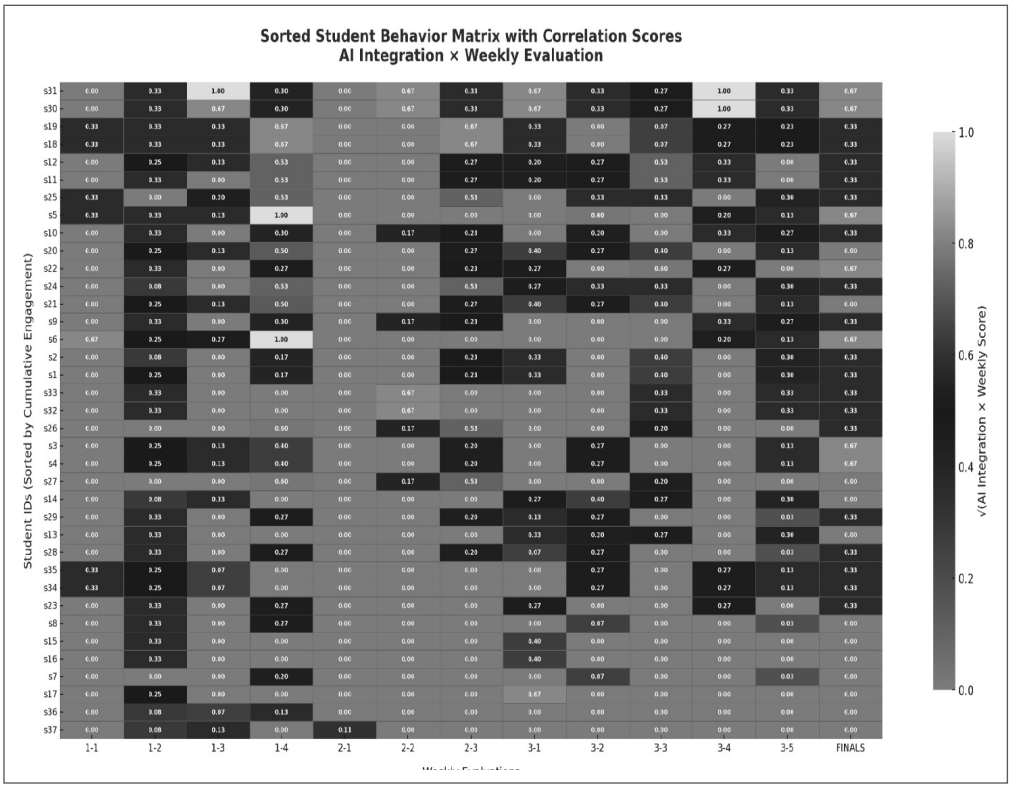


Fig. 5 Interaction Matrix based on Correlation Scores: AI Integration X Graded Evaluation Scores - Weekly Normalized Heatmap

temporal consistency. This visual mapping reveals distinct clusters of early adopters, late integrators and persistent resistors.

2.7 - Methodological Limitations

While this study offers a high-resolution temporal mapping of AI engagement in design pedagogy, it is important to acknowledge that there are several limitations. First, it is important to acknowledge that AI integration scoring relied partly on self-reporting and tutor interpretation during weekly consultations. This introduces an inherent degree of subjectivity. While we have attempted to moderate variations in evaluative perception through the use of visual evidence and standardized criteria, it is possible that some differences may still persist. Second, the diversity in students' prior exposure to AI tools, ranging from enthusiastic early adopters to digitally under-equipped participants, may have influenced adoption patterns independently of pedagogical design. These factors underscore the intricacy of gauging emergent competencies in a rapidly evolving digital landscape.

3 - RESULTS

3.1 - Temporal AI Adoption Patterns and Interaction Peaks

A gradual crescendo of AI engagement emerges throughout the semester, indicating a growing familiarity with toolchains and a strategic differentiation in their pedagogical role. Weeks 1.4 and 2.3, which are perhaps perceived as time-sensitive assignments due to their cognitive workload (see Fig. 1), emerge as peak moments of synchronized AI performance alignment, as evidenced by their high geometric interaction scores (0.637 and 0.481, respectively). Lower local peaks typically correspond to design-intensive assignments that required formal articulation, parametric complexity, or speculative reasoning, such as those in systems thinking (Weeks 1.2 and 1.3), geometrical rationalization (Week 3.1), and final manifesto detailing (Week 3.5). In contrast, weeks that focused on contextual analysis or geopolitical comprehension (e.g., Weeks 2.1 and 2.2) had minimal AI engagement. This reinforces the idea that it is representational complexity rather than thematic content alone that activates digital toolchains.

Table 3 Normalized Weekly Means of AI Use, Grades and Interaction Score. Scores were normalized independently per metric to ensure intra-week comparability; interaction values reflect compounded engagement intensity via geometric averaging.

Week	Normalized Mean AI Use (0–1)	Normalized Mean Grade (0–1)	Normalized Interaction Score
1.1_Forms'-Structure	0.072	0.266	0.139
1.2_Systems^Subsystems	0.297	0.467	0.373
1.3_Depth^Synthesis_Workshop	0.189	0.418	0.281
1.4_Phenomenological-Explorations_Pin-Up-1	0.405	1.0	0.637
2.1_Understanding-Territories	0.027	0.127	0.059
2.2_Superposition (Week 6 & 7)	0.117	0.0	0.0
2.3_Contextual-Tales_Pin-Up-2	0.297	0.779	0.481
3.1_Geometrical-Rationalization-1	0.252	0.402	0.318
3.2_Architectural-Rationalization	0.261	0.311	0.285
3.3_Structural-Assembly	0.243	0.209	0.225
3.4_Materials-And-Details	0.162	0.369	0.245
3.5_Manifesto-For-The-Unbuilt_Pin-Up-3	0.27	0.754	0.451
3.6_Finals	0.288	0.918	0.287

3.2 - Heatmap Analysis and Correlation Sorting

The Interaction Matrix Heatmap (see Fig. 5) visually encodes the synchronous behaviour of AI use and students' performance per week. Crucially, students were sorted by their total cumulative interaction score, enabling the emergence of behavioural archetypes. The vertical clustering reflects longitudinal commitment to digital experimentation. This dataset yielded five emergent types, rooted in the earlier diagnostic form:

- Digital Emergers (A): High synchronous use and grades (≥ 70% of max)
- Strategic Adopters (B): Medium-high synchronous use (≥ 50–70%)
- Cautious Integrators (C): Irregular but present engagement (≥ 30–50%)
- Disengaged (D): Low interaction scores (≥ 15–30%)
- Resistant (E): Negligible use and low grades (≤ 15%)

This clustering was derived from each student's **cumulative interaction score** (summed from the normalized matrix), then divided by the theoretical maximum possible interaction (sum of $\sqrt{(1 * 1)}$ over 13 weeks). The normalized results enabled type assignment independent of raw score fluctuations or task intensity.

3.3 - Cohort Stratification and Final Typologies

Based on the criteria above, the 37-student cohort stratified as follows:

Typology	Description	Range (% of Interaction Max)	Number of Students
Type A – Digital Emergers	Consistently high AI-performance correlation	≥ 70%	**3 students**
Type B – Strategic Adopters	Selective but impactful use of AI tools	50–69%	**7 students**
Type C – Cautious Integrators	Sporadic use with moderate alignment	30–49%	**10 students**
Type D – Disengaged	Minimal engagement with tools or logic	15–29%	**9 students**
Type E – Resistant	Near-total abstention or failure	≤ 15%	**8 students**

This stratification is consistent with the diagnostic attitudes of the pre-semester and indicates an evolutionary trajectory in the adoption of tools. It is important to note that the majority of students (combined Type B and C = 17) exhibited partial but significant alignment with the studio's epistemological framework, despite not having high digital fluency at the beginning of the semester.

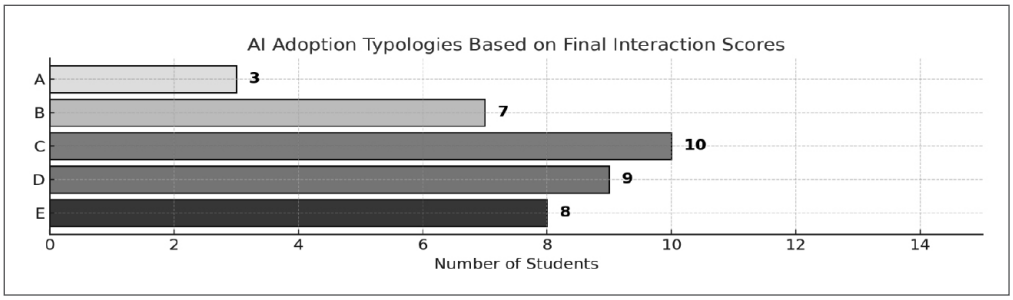


Fig. 6 Distribution diagram of Emerging Adoption Typologies after analyzing tool adoption behaviour, performance rhythms, and design trajectories across the semester

3.4 - Cross-Matrix Interpretations

The coherence between the diagnostic phase (Section 3) and the results phase indicates that initial attitudes were not fully deterministic of final behaviours. Several students who declared uncertainty or scepticism toward AI integration evolved into medium or high adopters. This suggests that studio structure, weekly framing, and consultative dialogue played key roles in shaping digital engagement trajectories by transforming hesitation into experimentation.

4 - DISCUSSION

4.1 - Temporal Competence, Pedagogical Responsibility, and the Intuition Gap

The results of this study support that the integration of AI in architectural design education cannot be solely attributed to the presence or absence of technological use, nor can it be completely elucidated by cognitive ability or curriculum structure. The ecology that emerged from the semester-long observation is more nuanced. It is a process that involves a delicate approach of individual readiness, infrastructural conditions, and pedagogical positioning, all intertwined with the use of AI tools. The identified typologies, ranging from digital emergers to resistant participants, appear to reflect not only skill variance but also more profound patterns of temporal alignment, motivation, and conceptual trust.

The nonlinear emergence of digital competencies should serve as a critical lesson. Students' engagement patterns were not consistently predicted by their attitudes toward AI, regardless of whether they were optimistic or pessimistic. The rhythms of interaction were rather influenced by three overlapping dynamics: (1) the weekly thematic and cognitive load, (2) the alignment of design tasks with AI capabilities, and (3) the degree to which tutors provided dialogical framing. These results support the idea that digital fluency is not a static attribute that can be quantified, but rather a condition that must be activated and sustained over time.

The study revealed significant infrastructural and pedagogical obstacles that could constrain the equitable expansion of AI utilization. Access to high-performance gear, paid tool subscription and stable internet bandwidth varied among students. These inequalities often limited the ability to experiment with AI-generated visual outputs or real-time generative feedback. Although these elements were not documented as formal variables,

they surfaced during consultations and debriefs as impediments to more in-depth research. This highlights a systemic disparity that is structural rather than pedagogical. As a result, higher education institutions (HEIs) are obligated to invest in the physical and digital resources necessary for equitable AI integration.

From a pedagogical perspective, tutors share a crucial responsibility: they are not expected to merely teach AI tools as fixed software packages, but rather to guide students through the adaptive reasoning and ethical framing that these tools demand. This shall be considered prior the semester's start – by careful integration of AI methodologies in the syllabi, - during, as well as at the very end, for reflection. AI literacy in architectural education should extend beyond basic interface navigation. The objective is to cultivate critical awareness, experimental rigor, and context-specific application. As noted by several scholars, generative AI systems are built for intuitive use, avoiding steep learning curves (Pangrazio & Selwyn, 2019). However, without intentional critical framing, this accessibility has the potential to mislead students into adopting superficial or stylistically convergent practices. Therefore, the long-term pedagogical objective is not to standardize AI competence, but rather to contextualize it. It is crucial to prepare students for a professional landscape in which AI is not optional, but rather deeply embedded across ideation, fabrication, and decision-making. This entails a shift from content-based instruction toward cognitive mentoring, which helps learners identify when, why, and how to activate digital collaborators.

4.2 Future Recommendations

For future replications of this methodology, we advocate a layered approach combining (1) diagnostic calibration of digital thresholds, (2) longitudinal interaction mapping, and (3) behavioural typology construction. This multi-scalar model allows educators to measure AI engagement and understand its internal temporality, alignments with student identity, and divergence from curriculum pacing. It is suggested that such models should be deployed with institutional support, due to the infrastructural misalignments of AI integration infrastructural needs, compared to the actual socio-technical environments in which education operates.

4.3 Ethical Ambiguities of AI Co-Authorship

This study highlights the potential benefits of voluntary AI participation in education. At the same time, it acknowledges the ongoing ethical challenges related to authorship, intellectual property, and creative originality. The incorporation of generative systems, especially text-to-image models, large language models (LLMs), and algorithmic renderers, complicates the assignment of creative agency. In some cases, student outputs demonstrated significant formal sophistication or narrative depth facilitated by AI technologies, prompting valid questions regarding the distinction between augmentation and substitution. These contradictions signify extensive academic debates around the attenuation of authorial intent, the degradation of stylistic identity, and the commodification of design intelligence.

Moreover, the pedagogical environment of speculative studios, where iterative ambiguity is embraced as a driver of creativity, further blurs the delineation of human and

non-human contributions. Although this study's scoring rubric emphasized coherence and contextual relevance over tool usage, the absence of standardized protocols for declaring AI influence poses risks to academic integrity and the professional valuation of student authorship. As generative AI becomes more intuitive and prevalent, higher education institutions must urgently establish ethical frameworks that differentiate between authorship, co-authorship, and tool usage, particularly in creative disciplines.

This ethical dimension is central, not peripheral, to cultivating future digital competencies, -not only as skills for "white" manipulation, but as attitudes of responsibility, transparency, and epistemological awareness.

REFERENCES

Bond, M., Khosravi, H., De Laat, M., Bergdahl, N., Negrea, V., Oxley, E., Pham, P., Chong, S. W., … Siemens, G. (2024). A meta systematic review of artificial intelligence in higher education: A call for increased ethics, collaboration, and rigour. *International Journal of Educational Technology in Higher Education*, 21, 4. https://doi.org/10.1186/s41239-023-00436-z.

Carpo, M. (2017). *The Second Digital Turn: Design Beyond Intelligence*. MIT Press.

Cai, Q., Lin, Y., & Yu, Z. (2023). *Factors influencing learner attitudes towards ChatGPT-assisted language learning in higher education. International Journal of Human–Computer Interaction*, 40(22), 7112–7126. https://doi.org/10.1080/10447318.2023.2261725.

Celani, G., & Vaz, C. E. V. (2012). CAD Scripting and Visual Programming Languages for Implementing Computational Design Concepts: A Comparison from a Pedagogical Point of View. *International Journal of Architectural Computing*, 10(1), 121–138. https://www.researchgate.net/publication/274531480_CAD_Scripting_And_Visual_Programming_Languages_For_Implementing_Computational_Design_Concepts_A_Comparison_From_A_Pedagogical_Point_Of_View

Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education*, 20, 22. https://doi.org/10.1186/s41239-023-00392-8.

Ferrari, A. (2013). DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe. *European Commission Joint Research Centre*. https://www.researchgate.net/publication/282860020_DIGCOMP_a_Framework_for_Developing_and_Understanding_Digital_Competence_in_Europe

Oxman, R. (2017). Thinking Difference: Theories and Models of Parametric Design Thinking. *Design Studies*, 52, 4–39. https://www.researchgate.net/publication/279199673_Theories_and_Models_of_Parametric_Design_Thinking

Pangrazio, L., & Selwyn, N. (2019). 'Personal data literacies': A critical literacies approach to enhancing understandings of personal digital data. *New Media & Society, 21*(2), 419–437. https://doi.org/10.1177/1461444818799523 https://www.researchgate.net/publication/327778736_'Personal_data_literacies'_A_critical_literacies_approach_to_enhancing_understandings_of_personal_digital_data

Picon, A. (2021). *The Materiality of Architecture*. University of Minnesota Press. https://www.researchgate.net/publication/385882273_The_materiality_of_architecture_between_the_rise_of_the_Digital_Age_and_the_advent_of_the_Anthropocene

Redecker, C. (2017). European Framework for the Digital Competence of Educators: DigCompEdu. *Publications Office of the European Union*. https://www.researchgate.net/publication/329191291_European_Framework_for_the_Digital_Competence_of_Educators_DigCompEdu

Vuorikari, R., Kluzer, S., & Punie, Y. (2022). DigComp 2.2: The Digital Competence Framework for Citizens with New Examples of Knowledge, Skills and Attitudes. *European Commission Joint Research Centre*. https://publications.jrc.ec.europa.eu/repository/handle/JRC128415

DEFINING A STRATEGIC ACTION PLAN FOR AI IN HIGHER EDUCATION

Nikolaos **AVOURIS**

Emeritus Professor, University of Patras, Patras, Greece
avouris@upatras.gr

Abstract

This paper discusses key challenges of Artificial Intelligence in Education, with main focus on higher education institutions. We start with reviewing normative actions of international organizations and concerns expressed about the current technical landscape. Then we proceed with proposing a framework that comprises five key dimensions relating to the main challenges relating to AI in higher education institutions, followed by five key strategic actions that the main stakeholders need to take in order to address the current developments. We map these actions to the main stakeholders of higher education and propose a deployment plan. This defines a framework along the dimensions: Challenges, Actions, Stakeholders, Deployment CASD. Examples of AI specific actions at the institutional and individual course level are also provided and discussed.

Keywords: AI, Higher Education, politics in higher education

ABOUT THE AUTHOR

NIKOLAOS AVOURIS

Nikolaos M. Avouris received his diploma in Electrical Engineering from the National Technical University of Athens, Greece, in 1979. He earned his M.Sc. (1981) and Ph.D. (1983) degrees from the University of Manchester Institute of Science and Technology (UMIST), U.K. He was a Postdoctoral Researcher at UMIST from 1983 to 1984, an Assistant Professor at the Technical Educational Institute of Athens (1985–1986), a Scientific Officer at the Joint Research Centre (JRC) in Ispra, Italy (1986–1993), and a Software Engineer at the Public Power Corporation (PPC), Athens (1993–1994). In 1994, he joined the University of Patras, Greece, where he served as Associate Professor until 2001, when he was appointed Full Professor of Software Engineering and Human–Computer Interaction (HCI). He is the founder and head of the HCI Group at the University of Patras. His research interests include the design and evaluation of interactive systems, usability engineering, collaboration technologies, context-aware computing systems, and the analysis and evaluation of collaborative activities. Professor Emeritus, University of Patras.

INTRODUCTION

We live in accelerated transformative times in education, as AI is increasingly embedded across all levels and forms of formal and informal learning, like in most aspects of life. Common educational applications of AI include personalized learning, AI tutors, automated assessment and feedback, curriculum design support, support for lifelong learning pathways, management of admissions/ progression decisions and many more. As Kasneci *et al.* (2023) argue, while large language models (LLMs) offer unprecedented support for personalized learning, feedback, and access to knowledge, they also pose complex challenges for academic integrity, transparency, and educational equity. The common practice in most higher education institutions is depicted in the recent Educause Horizon Report (Robert *et al.*, 2025) which confirms the continuous rise of use of AI in universities and outlines the current practice: On one hand, the students are increasingly reported using AI tools like ChatGPT to generate essays, do research, or get help with assignments, while teachers are experimenting with AI-driven lesson planning and assessment. On the other hand, the key stakeholder's express serious concerns, about academic integrity, and the erosion of original thought, while teachers' express questions about how to teach critical thinking and writing when AI can play that role effectively.

In the associated faculty survey (Robert *et al.*, 2025), the responses showed that some instructors embrace AI as a learning assistant, guiding students in how to use it ethically, while others design AI-resistant assignments, like oral exams or handwritten essays. Finally, in terms of institutional policies, many universities and schools are rethinking assessment policies and academic integrity rules, while special emphasis is shifting toward AI literacy, that aims at educators helping students learn how to collaborate with AI, not just avoid it. Studies like Vargas-Murillo et al. (2023) literature review of GenAI in higher education, highlight that AI is already reshaping academic practices internationally — prompting institutions to develop policies that balance innovation, fairness, and integrity in AI-assisted learning environments.

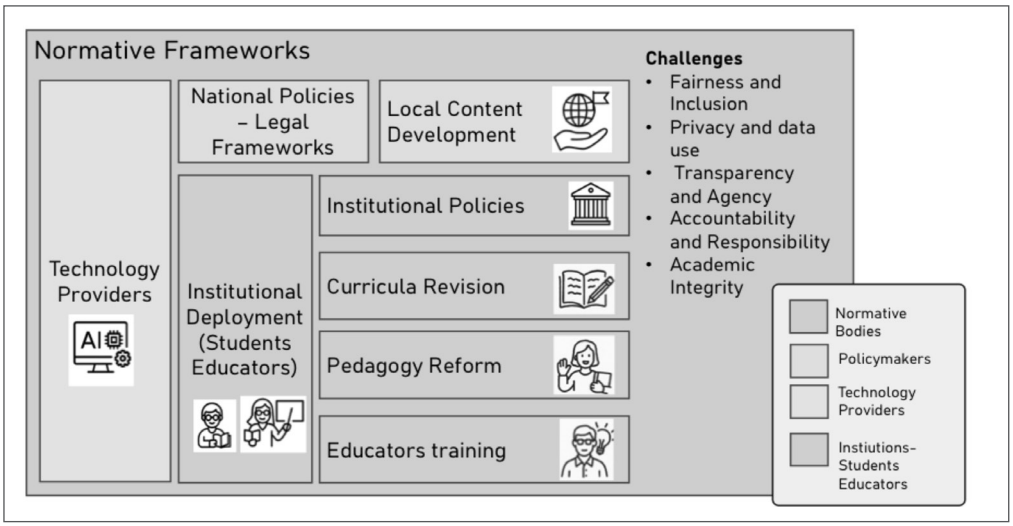


Fig. 1. Components of the CASD (Challenges, Actions, Stakeholders, Deployment) framework

There have been various attempts and guidelines for policies development, both from international institutions, like UNESCO, EU, etc, and universities associations, like the APRU maturity framework (Liu & Bates, 2025), that reflects the institutional culture, policies, access, familiarity and trust to AI, that determine how to design, implement, and evaluate an AI strategy at institutional level.

In this paper, we review the current literature and proposals by international institutions and researchers to define the main challenges related to AI in Education, next we present, given these challenges, key dimensions of concern followed by a set of key strategic actions to address these concerns and deployment of these actions. Next, we define the framework dimensions, starting from the key challenges of AI. The main components of the proposed framework are shown in Fig. 1, which, illustrates how challenges inform strategic actions that are mapped to stakeholders and implemented through deployment strategies.

NORMATIVE FOUNDATIONS OF AI

We start with identifying the main challenges related to AI. In order to do that, we first review normative frameworks that have been issued by authoritative bodies, concerning design, deployment and governance of AI. A key reference is the widely adopted framework proposed by UNESCO (2021), that is grounded in human rights, inclusion, sustainability, and peace. In particular, this framework outlines four foundational values that may be affected by AI: (i) *Human Rights and Human Dignity*, i.e. AI must not infringe on learners' fundamental rights (e.g., privacy, autonomy, expression). (ii) *Environmental Sustainability* that commands that AI systems should be designed and used in ways that support sustainability, especially relevant for educational technology systems consuming large-scale data and energy, (iii) *Diversity and Inclusiveness*, AI must be inclusive, respecting different languages, cultures, identities, from which stems the need for localization of AI tools to reflect educational and linguistic diversity, and finally (iv) *Living in Peaceful, and Just Societies*, which implies that education should prepare learners to engage critically and ethically with AI in civic life. A value that emphasizes digital literacy, fairness, and social cohesion. Next the UNESCO framework proceeds with proposal of ten key principles, that are actionable ethical rules, based on these fundamental values. The principles, with examples of their implication in the education sector, are:

- *Privacy and Data Protection*, which relates to possible mass collection of student data via e-proctoring or educational technology platforms
- *Fairness and Non-Discrimination*, which concerns algorithmic bias disadvantaging underrepresented student groups, and marginalized languages
- *Proportionality and Do No Harm*, resulting in the principle that AI systems should not cause more harm or risk than necessary to achieve their intended purpose.
- *Safety and Security*, relating to exposure of minors to manipulative or unsafe systems
- *Human Oversight and Determination*, that concerns the danger of teachers loosing control over AI tutoring systems
- *Accountability and Responsibility*, that relates to cases of unclear responsibility for automated decisions in learning analytics

- *Transparency and Explainability*, concerning black-box algorithms in grading or recommendation systems
- *Awareness and Literacy*, e.g. cases of students and staff to be unaware of how AI tools work
- *Sustainability*, that relates to overuse of high-resource AI tools that burden IT infrastructure
- *Multi-stakeholder Governance*, that proposes that governance of AI must include diverse stakeholders: educators, students, parents, technologists, policymakers, civil society.

These ten principles consolidate ideas found in many other, similar frameworks or guidelines, like the UNESCO Guidelines for GenAI in education and research (UNESCO, 2023), the Council of Europe Report on AI and Education (Holmes *et al.* 2022), the European Commission Guidelines, a practitioner-oriented resource that aim at promoting the responsible integration of AI and data in education, (European Commission, 2022), and the Unesco report (Miao *et al.*, 2021) with guidelines for policy makers, that translates high-level ethical and strategic frameworks into practical policy considerations specifically for education systems.

THE AI CHALLENGES

Next, summarizing the proposals of the discussed normative frameworks, we define the five challenges that need to be addressed making *Dimension C* of our framework:

- Challenge C1: *Fairness and Inclusion*. Artificial intelligence can unintentionally reinforce bias. Whether in grading, tutoring, or content recommendations, AI may reflect existing social inequalities. It can also exclude students whose needs or languages are underrepresented in the data. To ensure AI in education is fair, we must proactively design for inclusion—considering accessibility, multilingual support, and cultural diversity. Fairness isn't just a technical issue; it's an ethical commitment to serve all learners.
- Challenge C2: *Privacy and data use*. AI systems rely heavily on data—often personal, often sensitive. In education, this includes student behaviour, assessment patterns, even emotional states. Without robust protections, AI tools can compromise privacy and data sovereignty. We must ensure that students and teachers are not merely data sources, but informed participants.
- Challenge C3: *Transparency and Agency*. It is known that many AI systems operate as black boxes. They offer recommendations or assessments, but their reasoning is obscure—even to the educators using them. This undermines trust and can erode the autonomy of both students and teachers. Transparency is essential: educators should understand how tools work, and students should retain control over their learning. AI must support - not replace - human judgment and critical thinking.
- Challenge C4: *Accountability and Responsibility*. When the AI system misjudges a student's answer or gives biased feedback, the question raises who is responsible? Without clear accountability, these errors go unchecked. Institutions must ensure that AI use in education is supervised, auditable, and ultimately human-led. Ethical use requires

human oversight, clear escalation paths, and shared responsibility between developers, educators, and administrators.

- Challenge C5: *Academic Integrity*. This challenge is not explicitly present in the normative frameworks, yet it is the main concern of stakeholders, as discussed in Robert *et al.*, (2025), as it touches on many ethical principles of AI. Current AI tools like Large Language Models chatbots pose new questions about originality, authorship, and fairness in education. We need to rethink integrity, not just as enforcement, but as empowerment: teaching students to use AI responsibly, reflecting on how it's used, and designing assignments that reward genuine thinking.

In the next section we proceed with proposing a set of strategic actions to address the discussed here challenges.

THE STRATEGIC ACTIONS

Many proposals have been made for actions to be taken to address the challenges of AI in education. For instance, European Commission (2022) and UNESCO (2021b) contain such ideas. Chan (2023) and Chan & Colloton (2024) have made comprehensive proposals for a policy education framework for university teaching and learning. At the level of institutional policies, there have been many publications reviewing specific countries or compare policies across areas. The review of Dell'Erba *et al.* (2025) concerns the policy documents of top-ranked universities, focusing on the innovation-regulation tension, while Jin *et al.* (2025) analyse adoption of GenAI policies in 40 universities across six global regions focusing on the characteristics of the institutions, like compatibility, trialability, observability, and the communication roles/responsibilities, using innovation diffusion theoretical framework. Finally studies in specific countries reveal the characteristics of their educational systems. Abir & Zhou (2025) who studied Japanese universities, found out their cautious stance toward GenAI, emphasizing concerns about academic integrity, transparency, and unintended misuse, while Li *et al.* (2025) performed a cross-national comparative study involving over 100 policy documents across the US, Japan and China. Using these findings, they developed the UPDF-GAI model for guiding universities in developing AI policies. It is interesting to observe that from this study, the different orientation of different academic systems emerged, with the US leaning toward faculty autonomy, Japan emphasizing government-regulated frameworks, and China generally aligned with a centralized, top-down model, prioritizing AI integration and technology-driven implementation over early-stage policy structuring. Based on these ideas, we provide here a set of key strategic actions, defining the *Action Dimension* of our framework.

- *Action 1*: *Revise Curriculum.* We need to make drastic changes to the curricula content, in order to teach learners how to critically analyse information and verify their sources and develop digital literacy skills that can help them better understand how AI technologies work and how to use them responsibly, this needs to be adapted to the requirements of each subject matter.

- *Action 2*: *Reform Pedagogy*. The way we teach should be adapted in the times of AI. Emphasis should be given on assignments and assessments conducted in class, so that the use of AI for solving problems and completing assignments can be monitored and the unfair use of AI can be avoided.
- *Action 3*: *Training of Educators*. We need to design training programs for educators so that they can better understand AI technologies and effectively integrate their capabilities into the educational process.
- *Action 4*: *Support Local Content*. We need to ensure that the AI models used in education can be properly trained in the local language and with local data, by providing high-quality, machine-readable local content. An interesting relevant observation is that the corpora used for training AI models, have often bias in certain languages and cultures. For instance, the OSCAR23[1] corpus, a large-scale, multilingual text dataset, with around 1 trillion words, derived from the Common Crawl web archive, used for training many AI models, contains 48% of content in English, and just 0.71% in Greek, or 0.04% in Albanian, while some minority languages are not existent.
- *Action 5: Establish Policy and Governance*. Educational institutions must establish clear regulations regarding the use of AI technologies, defining what is permitted and what is not, as well as the consequences of related violations of academic integrity.

It is obvious from the list of these strategic actions that these responses require participation of different stakeholders of the higher education ecosystem. In the next section we will discuss the role of the five key stakeholders in these actions.

THE ROLES OF STAKEHOLDERS

We consider the following five key stakeholders of the higher education ecosystem: the Students, Educators, Institutions, Policymakers and Technology providers. We will briefly describe next their roles in the proposed strategic actions.

- *S1. Students*. These are the main stakeholders as they are the target of the main mission of the higher education system. They participate as receivers of the new services. They are affected by *Revised Curriculum*, as through this action's results they gain AI literacy and awareness of ethical use, by *Reformed Pedagogy*, as they experience new ways of teaching, for instance, more inclusive, AI-aware assessments and by *Support Local Content*, as they have, as a result, access to AI tools relevant to their language and culture.
- *S2. Educators*. The faculty of higher education need to adapt to the new conditions, participating actively in all proposed strategic actions, In *Revised Curriculum*, they are asked to teach new topics encouraging critical thinking and AI literacy. For *Reform Pedagogy*, they need to adapt their teaching using new AI-resilient assessment, In *Train Educators*, to participate in faculty training actions to acquire competence to use and explain AI tools, in *Support Local Content* to teach using culturally appropriate and multilingual tools, and in *Policy & Governance,* to implement the AI policies of the institutions.

[3] https://oscar-project.github.io/documentation/versions/oscar-2301/

- *S3. Institutions*. The higher education institutions are asked to play a key role according to the proposed framework. For *Revise Curriculum* They need to develop curricula that align with digital competencies and AI use, for *Reform Pedagogy,* they need to encourage pedagogy that includes fairer evaluation methods, for *Train Educators,* to provide training programs and support systems for their faculty, in *Support Local Content*, to invest in open educational resources and local repositories, and in *Policy & Governance.* to establish oversight and internal governance structures.
- *S4. Policy Makers*. These are institutions at the national level (e.g. Ministries of Education) or international level (e.g. EU, UNESCO, etc.). There are already recommendations for policies, as discussed in previous section, while the EU in its AI Act makes explicit reference to the education sector as a high-risk domain with obligations for technology providers and for institutions. However, there are not explicit policies in most parts of the world. The role of the policy making bodies is crucial. In *Revise Curriculum,* the policies should contain curriculum guidelines that include AI ethics and AI literacy, for *Reform Pedagogy*, policies should exist that encourage compliance with national and international standards for ethical AI based pedagogy. For *Train Educators*, there should be funding and policies that mandate teacher training on AI, for *Support Local Content*, policies that ensure content diversity and inclusion, with local language and culture. *Policy & Governance,* there should regulate all aspects of development and use of AI in education, based on ethical frameworks.
- *S5. Technology Providers*. The responsibilities of the AI technology providers are high according to the normative recommendations and the existing legal framework, e.g. the EU AI Act, foresee that the developers of the technology bear most of the legal burden relating to compliance, documentation and risk management. In the frame of *Reform Pedagogy,* they are required to develop technologies supporting ethical and creative pedagogy, for *Support Local Content,* they are required to localize the developed AI systems for underrepresented languages or contexts, and for *Policy & Governance*, they need to take all necessary actions to comply with standards; ensure ethical, transparent, equitable technologies.

Having outlined the strategic actions and their mapping to key stakeholders, we now turn to the question of how this framework can be implemented effectively in institutional settings.

FRAMEWORK DEPLOYMENT

As discussed in the previous sections, the proposed here framework requires the active involvement of all key stakeholders of the higher education ecosystem. Given that the technological ground of AI is in continuous evolution, a deployment of such framework needs on one hand, to be flexible to accommodate this shifting technological background, and on the other hand, to match the readiness and the culture of the specific institution or educational system. Liu & Bates (2025) identify five important dimensions, that make up the CRAFT framework for AI strategy implementation in a higher education institution:

Culture, Rules, Access, Familiarity, Trust. These dimensions relate to alignment of the AI strategy with institutional mission, pedagogical values, and change-readiness (the *Culture* dimension), to definition of rules that provide the governance layer: ethical guidelines, acceptable use policies, and accountability structures, to ensure equitable access to AI tools to training, and infrastructure across all stakeholders (the *Rules* dimension), to build AI literacy, technical skills, as well as critical, ethical, and creative competences (the *Familiarity* dimension), and finally the *Trust* dimension, that facilitates transparency, dialogue, and confidence in institutional strategy and tools. This leads to a roadmap for deployment of AI policies, following a sequence of steps:

- Start with Culture, by surveying faculty/ student values, identify champions, and establish how ready the institution is for establishing these policies,
- develop the Rules through outlined actions, like co-creation of policies on ethical use of AI, especially in assessment (guidelines for pedagogy reform and new curricula),
- next, there is need to ensure access, this is done by deploying institutionally supported AI tools, while special measures have to be providing in ensuring language/inclusive access,
- then build familiarity, i.e. to offer cross-disciplinary AI literacy programs; empower staff (teacher training action), and
- finally, in order to establish trust, there is need to share data about AI use outcomes; and invite ongoing community input.

Furthermore, Chan & Colloton (2024), provide guidelines to enhance the deployment framework: As a starting point, they focus on changing institutional culture, from awareness of AI's educational implications to proactive leadership engagement and identification of faculty champions, role-based responsibilities, feedback mechanisms, and aligning AI strategy with institutional mission. They also provide a policy blueprint for institutional AI guidelines, including templates for acceptable use, ethical standards, and operational processes, while they advocate an iterative, inclusive design process with experts, faculties, librarians, disability services, and IT teams participating in co-design.

CONCLUSIONS AND FUTURE DIRECTIONS

In this paper we have reviewed normative approaches to AI in education and outlined a framework for design and deployment of policies for higher education. Concluding this review, we provide some references to resources that can help with implementing the proposed action plan. First at the level of individual courses, there are various examples. Stanford Teaching Commons (2023) provide templates to instructors through an AI Teaching guide, with specific guidelines on course AI policies, AI-resistant assignments, and support for AI literacy. Avouris *et al.* (2025) have described the experience of re-design of a computer science course in order to be AI-resilient, providing examples on re-design of assessment strategies, pedagogy and learning objectives of the course, while Chan & Colloton (2024) propose strategies for redesigning assignments and evaluation, the *Six assessment redesign pivotal strategies*.

In conclusion, as AI technologies continue to evolve, higher education institutions must adopt dynamic, inclusive, and ethically grounded strategies. The proposed framework offers a foundation for such action, yet ongoing collaboration between educators, students, policymakers, and developers remains essential. We should however consider the risks and barriers of the strategic framework, like institutional resistance, funding, faculty disposition, that may affect its implementation. Future work should focus on evaluating institutional readiness, piloting policy innovations, and fostering global exchange of good practices in AI-enhanced education. Frameworks like the DigiReady+ (Chounta *et al.* 2024), that measure digital readiness of higher education institutions can be useful tools in supporting this process.

REFERENCES

Abir, M. G. H., & Zhou, K. Z. (2025). Examining Generative AI Policies in Japanese Universities: A Qualitative Perspective. Available at SSRN 5374222.

Avouris N., Sgarbas K., Caridakis G., Sintoris C., (2025). Teaching Introduction to Programming in the times of AI: A case study of a course redesign, *12th Panhellenic Conference on Computer Science Education*, Rhodes, October, 2025.

Chan, C. K. Y. (2023). A comprehensive AI policy education framework for university teaching and learning. *International journal of educational technology in higher education*, *20*(1), 38.

Chan, C. K. Y., & Colloton, T. (2024). *Generative AI in higher education: The ChatGPT effect* (p. 287). Taylor & Francis.

Chounta, I. A., Ortega-Arranz, A., Daskalaki, S., Dimitriadis, Y., & Avouris, N. (2024). Toward a data-informed framework for the assessment of digital readiness of higher education institutions. *International Journal of Educational Technology in Higher Education*, 21(1), 59.

Dell'Erba, C., Ruffini, L., Silva, R., & Consoli, L. (2025). Mapping global generative artificial intelligence guidelines in higher education: the ambiguous balance between innovation and regulation. In *EduLearn25 Proceedings* (pp. 5710-5720). IATED.

Directorate-General for Education, Y. (2022). Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators. *Publications Office of the European Union*. https://data.europa.eu/doi/10.2766/153756

European Commission, (2022). Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators, *Publications Office of the European Union*. https://data.europa.eu/doi/10.2766/153756

Jin, Y., Yan, L., Echeverria, V., Gašević, D., & Martinez-Maldonado, R. (2025). Generative AI in higher education: A global perspective of institutional adoption policies and guidelines. *Computers and Education: Artificial Intelligence*, 8, 100348.

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., … Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274.

Li, M., Xie, Q., Enkhtur, A., Meng, S., Chen, L., Yamamoto, B. A., ... & Murakami, M. (2025). A Framework for Developing University Policies on Generative AI Governance: A Cross-national Comparative Study. *arXiv preprint* arXiv:2504.02636.

Liu, D. Y. T., & Bates, S. (2025, January). Generative AI in Higher Education: Current Practices and Ways Forward. *Association of Pacific Rim Universities Report*, available from https://biblioteca.unisced.edu.mz/

Miao, F., Holmes, W., Huang R. Zhang H. (2021). Artificial Intelligence and Education. Guidance for Policy-makers. *United Nations Educational, Scientific and Cultural Organization (UNESCO)*, Paris, France.

Robert, J., Muscanell, N., McCormack, M., Pelletier, K., Arnold, K., Arbino, N., Young, K. & Reeves, J. (2025): *2025 EDUCAUSE Horizon Report*, Teaching and Learning Edition: EDUCAUSE

Stanford Teaching Commons (2023) *Artificial Intelligence Teaching Guide*, available from https://teachingcommons.stanford.edu

UNESCO (2023). Guidance for Generative AI in Education and Research, *United Nations Educational, Scientific and Cultural Organization (UNESCO)*, Paris.

UNESCO (2021). Recommendation on the ethics of artificial intelligence. In *United Nations Educational, Scientific and Cultural Organization (UNESCO)* Paris.

Vargas-Murillo, A. R., Pari-Bedoya, I. N. M. de la A., & Guevara-Soto, F. de J. us. (2023). Challenges and Opportunities of AI-Assisted Learning A Systematic Literature Review on the Impact of ChatGPT Usage in Higher Education. *International Journal of Learning, Teaching and Educational Research*, 22(7), 122–135.

INSTITUTIONAL POLICIES AND STRATEGIC DIRECTIONS FOR ADVANCING DIGITAL COMPETENCIES IN HIGHER EDUCATION

Hajdin **BERISHA**,[1]* Agron **HAJDARI**,[1]
Bekim **SAMADRAXHA**[2]

[1]Public International Business College Mitrovica
[2]Department of Higher Education, Ministry of Education, Science, Technology and Innovation
The Republic of Kosovo
Corresponding Author*: h.berisha@ibcmitrovica.eu

Abstract

The rapid evolution of digital technologies is reshaping the landscape of higher education and demanding institutions to align their policies and practices with the skills required for a knowledge-based economy. Within the Kosovo higher education system, fostering digital competencies has emerged as a strategic priority to enhance teaching, learning, research, and graduate employability. This paper explores how institutional policies, and strategic directions can drive the systematic development of digital skills in higher education. It examines the current policy frameworks, highlights key challenges and identifies opportunities for further advancement. The study emphasizes the need for coherent governance, inclusive digital transformation, and sustainable investment to ensure higher education institutions can adapt to technology trends. Ultimately, the paper argues that advancing digital competencies is not only a technological imperative but also a strategic enabler for quality, equity, and international competitiveness in Kosovo's higher education system.

Keywords: Higher education, technology, policies, strategy.

ABOUT THE AUTHORS

HAJDIN BERISHA

Hajdin Berisha completed his BBA and MBA in Kuala Lumpur and received his Ph.D. from University of Marmara in Istanbul. Currently he teaches at the Public International Business College Mitrovica in Kosovo. His research interests and expertise include both management and education. Much of his work has been on improving organisational structures, corporate strategy, and corporate governance.

AGRON HAJDARI

Dr. Agron Hajdari is an Assistant Professor at the Faculty of International Business Management and a member of the Steering Council at the Public International Business College in Mitrovica (IBCM), Kosovo. He lectures in the fields of business, management, and entrepreneurship. With over 20 years of professional experience, Dr. Hajdari has made significant contributions to Kosovo's education system, particularly in education policy reform, vocational education and training, higher education, and the alignment of education with labour market needs. He has served in various expert roles, including project manager, capacity-building advisor, and quality assurance manager, and has been engaged in numerous international donor-funded initiatives supporting youth, employment, and education. His professional portfolio includes project development and management, institutional strengthening, and policy advising. Dr. Hajdari's research interests focus on entrepreneurship, particularly returnee entrepreneurship, return migration, labour market integration, and management. He is actively involved in both academic and applied research initiatives.

BEKIM SAMADRAXHA

Bekim Samadraxha, completed his BBA and MBA at the University of Prishtina and obtained his Ph.D. from the Public University of Tirana in Albania. He currently works in the Higher Education Department at the Ministry of Education, Science, Technology, and Innovation in Kosovo. His research interests are focused on legislation and the higher education strategy to improve the quality of higher education. He has also a long experience in teaching at several higher education institutions and has led the Kosovo Accreditation Agency.

PART THREE:
THE INTENDED
AND ATTAINED CURRICULUM

DIGITAL COMPETENCIES IN SOCIAL SCIENCES – A PILOT STUDY

From Design to Practice: Teaching Approaches in the HOMO DIGITALIS Project

Valbona **NATHANAILI**[1*], Blerta **DRENOFCI (ÇANI)**[1], Konstantinos **GIAKOUMIS**[1], Dušanka **BOŠKOVIĆ**[2], Arbana **KADRIU**[3], Anisa **DUKA**[1]

LOGOS University College, Tirana, Albania[1];
University of Sarajevo, Sarajevo, Bosnia and Herzegovina[2];
South East European University, Tetovo, North Macedonia[3]
*Corresponding Author: valbona.nathanaili@kulogos.edu.al

Abstract

This paper was prepared within the framework of the Homo Digitalis Project, a collaborative regional initiative advancing the digital transformation of Higher Education in the Western Balkans. The first aim of this study is to evaluate the extent to which academic staff of social sciences of several HEIs from Albania, Kosovo, and Bosnia and Herzegovina – all partners in this project – are prepared to integrate digital competencies into their syllabi in the social sciences. This was investigated through a structured questionnaire. Notably, the instructors involved in the study were selected based on their willingness to participate in the curricular redesign and engage with digital education practices. The second aim is to evaluate how the digital competencies have been integrated into the revised and delivered courses during the 2024–2025 academic year at LOGOS University College, the leading partner of this project. A mixed-methods approach was employed, combining a structured questionnaire (n = 14), a focus group, and a score matrix to evaluate both instructor readiness and the extent to which digital competencies were integrated into revised courses. This initiative represents a valuable starting point for introducing digital competencies in a structured and organized manner, aligned with the study program. Furthermore, following the piloting phase with university colleagues, the aim is to expand the scope of this study to include all partner institutions involved in the project. One key recommendation is to revise the formulation of generic and specific competencies, and to ensure they are identified in cooperation with educational institutions, agencies, or companies that serve as the Faculty's partners in programme development.

Keywords: Digital competencies, Homo Digitalis, Western Balkan, Social Sciences, Higher Education Curricula

ABOUT THE AUTHORS

VALBONA NATHANAILI

Dr. Nathanaili is currently a lecturer and researcher in the Department of Pedagogy and Psychology, LOGOS University College, Tirana, Albania, with an experience of more than 35 years in the field of academia and publication. She is a Bachelor in physics and a doctoral degree holders in the science of pedagogy, both from University of Tirana. Major areas of research over the last few years are the politics and reforms in Albanian Education System, methodology of teaching science, university pedagogy, the future of schooling and Recognition and Accreditation of Prior Learning gained after flexible learning paths.

She is analyst, writers and contributor for different periodic Albanian newspaper and television outlets. Nathanaili, in collaboration with different HEIs, has been initiator and supporter of STEM national campaigns, to encourage girls to pursue careers in science, technology, engineering and math fields and promote women in those fields. Dr. Nathanaili has extensive experience in designing and directing research and capacity building projects.

BLERTA DRENOFCI (ÇANI)

Dr. Drenofci has devoted her efforts for last 20 years at the Albanian Disability Rights Foundation, to the activities in advocacy and lobbying for disability related policy and legislation adoption and implementation and offering of supportive services for people in need throughout the country. She is an expert in the area of social policies and collaborator in the formulation of policy framework for people with disabilities in Albania.

She has directed ADRF contribution in several important legal initiatives. ADRF is acknowledged as the pioneer and leader of human rights-based approach to disability and it is one in the few organizations that offer models of supportive services like mobility means, supported employment, free legal aid for people in need in Albania. Blerta has an PhD in Social Sciences and has an academic background, being a teacher of University of Tirana since 2013.

She has been the leader and the author of a lot of studies in the field of social policies in and outside the country. She has been involved as a consultant in the research and policy development by several international agencies. During the years 2014-2022, she has been involved in the development of the new reform for the assessment of disability in Albania, based on international standards.

KONSTANTINOS GIAKOUMIS

Konstantinos Giakoumis is Professor of History, Arts and Didactics at LOGOS University College, where he also leads the Faculty of Humanities and Linguistic Communication. He is a doctoral degree (Ph.D.) holder PhD from the University of Birmingham, serves on the international advisory board of Art Readings (Institute of Art Studies, Bulgarian Academy of Sciences) and reviews for the Serbian Academy of Sciences, the University of Crete, and international journals including Speculum (University of Chicago Press), the Journal of Religious History (Wiley), and Politics, Religion & Ideology (Taylor & Francis). He has also served as coordinator of a number of ERASMUS+ CBHE projects (Roaming, Homo Digitalis, DiLanEdu-WB). For a Marie Curie fellowship application in 2018 he received the European Commission's Seal of Excellence. A prolific scholar, his work appears in leading journals such as Byzantine and Modern Greek Studies (Cambridge), Turkish Historical Review (Brill), and the International Journal of Cultural Policy (Taylor & Francis). His most recent book examines the Codex of the Diocese/Metropolis of Dryinoupolis and Gjirokastra (1760–1858), published by LOGOS University College Press.

DUŠANKA BOŠKOVIĆ

Vice Rector for Quality at the University of Sarajevo and a Professor at the Faculty of Electrical Engineering. Her research interests and teaching are focused on software engineering in biomedical and cognitive domains. She is highly motivated to learn about problem domains and committed to achieving a high level of user experience. In addition to teaching and research, she is engaged in various activities aimed at improving education in Bosnia and Herzegovina, especially through promoting student-centered and outcome-based learning and using software as educational content.

ARBANA KADRIU

Arbana Kadriu is a Full Professor of Computer Science at the Faculty of Contemporary Sciences and Technologies, South East European University (SEEU) in Tetovo, North Macedonia. She earned her PhD in Computer Science from Ss. Cyril and Methodius University, Skopje (2008), specializing in natural language processing and information retrieval. Her research spans AI and machine learning, software engineering, web information retrieval, social network analysis, and e-learning, with a growing focus on speech technologies for low-resource languages. Prof. Kadriu teaches across undergraduate, master's, and doctoral programs, organized into three clusters: Data & Intelligence, Software & the Web, and Research & Methods. She has supervised numerous master's and PhD theses in areas such as data mining–driven decision support, Albanian speech recognition, authorship analysis, and automatic music generation. Prof. Kadriu has authored 70+ publications across journals and international conferences (IEEE, Springer, PLOS ONE, and others) and contributes to international projects, including Erasmus+ initiatives on digital humanities and quality assurance, as well as COST actions on language technology and language learning.

ANISA DUKA

Anisa Duka is currently the Head of Student Affairs and Career Counseling Office at LOGOS University College. She graduated from the Faculty of Social Sciences, University of Tirana. During 2010-2012, she completed the Master of Sciences program in Teaching for Social Sciences, and in 2019, she obtained a Master of Science in Business Administration (MBA). Throughout her career, MSc. Anisa Duka has worked in various educational institutions. She served as a lecturer in the Faculty of Social Sciences at the University of Tirana. She has gained professional experience in management, communication, and student affairs. She has held positions as a specialist, head of office, and director in several higher education institutions, where she planned and organized activities in these fields. Furthermore, MSc. Anisa Duka has actively pursued professional and research development. She has participated in numerous seminars, conferences, and scientific trainings focused on addressing social issues within society.

INTRODUCTION

Recognizing the increasing importance of digital competencies in modern education, the HOMO DIGITALIS Project supports the integration of digital tools and pedagogies into academic curricula. Its primary objective is to build the digital capacity of both academic staff and students, thereby enhancing teaching quality, promoting student employability, and strengthening institutional innovation. Ultimately, this document aims not only to analyse the outcomes of updated course syllabuses, but also to contribute to a broader regional understanding of digital transformation in the framework of HOMO DIGITALIS Project.

Although the necessity to integrate digital tools in the humanities and education has been felt in the Western Balkans, as elsewhere, there is a scarcity of providers offering the expert knowledge, skills and competences necessary to develop properly trained professionals to engage technology for the purpose of devising creative solutions in a range of humanities and education application areas at cultural heritage institutions, schools, public agencies, international organisations and private companies (Homo Digitalis Project).

LITERATURE REVIEW

Professional Digital Competence (PDC) is an emerging and broader type of teacher digital competence that is inclusive of all aspects of being a teacher in schooling contexts and education systems where digital technologies are embedded (Starkey, 2020). Professional Digital Competence is increasingly framed as a situated capability that integrates pedagogy, classroom management in digital environments, and the wider professional work of teaching - rather than a set of generic ICT skills (Starkey & Yates, 2020; Lund *et al.,* 2014). Recent reviews note that the literature has expanded rapidly, but with uneven conceptual clarity, and they argue for holistic, practice-grounded models of PDC (Skantz-Åberg, Lantz-Andersson, & Williams, 2022; Peters *et al*., 2022).

Within this stream, Falloon (2020) advances a Teacher Digital Competency framework that moves beyond tool proficiency to include ethical, safe, and productive participation in digitally mediated learning ecologies, while Castañeda and Selwyn (2018) caution that "digitization" of education reshapes purposes and practices in ways that exceed mere technology integration. Operationally, the DigCompEdu framework synthesizes educator-specific digital competences into 22 descriptors across six areas and has been used to develop validated self-assessment instruments for teachers (Redecker & Punie, 2017; Ghomi & Redecker, 2019). Empirical work shows that PDC develops through authentic practice, mentoring, and collaborative inquiry, yet remains uneven among early-career teachers and student teachers (Masoumi & Bourbour, 2024; Quast *et al*, 2023).

The EU's agenda of building a "Europe fit for the digital age" has extended to its relations with the Western Balkans, where gaps in digital literacy among both citizens and public administration staff remain a persistent challenge (European DIGITAL SME Alliance). In the Western Balkans, comparative analyses document persistent

gaps in population-level digital skills relative to EU averages, underscoring the system conditions within which teachers enact PDC (Levkov & Kitanovikj, 2024). Complementary implementation research with SELFIE for TEACHERS in Albania and North Macedonia points to the need for targeted professional development and policy support aligned with competency frameworks (Economou *et al.*, 2024).

METHODOLOGY

This study adopts a two-phased mixed-methods design, implemented within the framework of HOMO DIGITALIS project aimed at integrating digital competencies into university-level teaching.

Research Questions

- What was the level of the Instructor preparedness? *Data source*: a structured questionnaire administered to academic staff.
- What was the level of the integration of digital competencies at each of the elements of the revised syllabus? Data source: seven revised syllabi from five study programs at Logos University College.
- What were the challenges faced by instructors during the process of integrating digital competencies and implementing the revised course? Data source: a focus group with 7 academic staff who revised their syllabi, supplemented by insights from core HOMO DIGITALIS project team members (3 members), who contributed with project-level insights and coordination experience.

Phase 1: Before intervention

As part of a structured intervention within the framework of the project, a selected group of university instructors teaching in social sciences faculties, revised their course syllabi to integrate digital competencies, drawing on the Digital Competence of Educators framework developed by Redecker and Punie (2017). The courses were chosen based on disciplinary diversity, relevance to digital transformation goals, and instructor willingness to participate, but also based on the subject expertise and the relevance of their courses to project objectives, with guidance and support provided by the project team.

For this phase, the main aim is to evaluate instructors' perspectives on the revised course syllabuses, focusing on their level of preparedness for the revision process, their collaboration with colleagues and external partners, and their reflections on the quality and relevance of the revisions - particularly in terms of digital competency integration. Part of this phase was the collection of qualitative data was through a focus groups with academic staff of LOGOS University College. The discussion was organised online, to explore experiences with the process of updated curricula, perceived benefits and challenges, and institutional support mechanisms. The questions were designed to probe the same themes covered in the quantitative tools, enabling triangulation of data sources.

Phase 2: After intervention

Following the intervention—implemented during the spring semester of the 2024–2025 academic year—the evaluation phase began. To assess the extent to which digital competencies were integrated into the revised course syllabi, we developed a structured rubric aligned with the core elements of a syllabus. The instrument focuses on three components: competencies, course content, and assessment methods. Each syllabus was evaluated across these three dimensions using a Likert-type scale from 0 (not present) to 4 (fully integrated), providing a clear snapshot of the current state of syllabus revisions within the project framework (see Annex 3). The rubric is implemented in a customized Excel spreadsheet, allowing evaluators to select scores from a drop-down menu and enter qualitative justifications for each score directly adjacent to the numerical rating. This dual format (quantitative + qualitative) ensures: Triangulated analysis, combining measurable indicators with contextual reasoning, Inter-rater reliability, through structured scoring guidance, Comparability, by automatically calculating total scores per syllabus (ranging from 0 to 12). This evaluation tool was applied to all revised syllabi (initially 8, with plans for expansion to 37+), forming the foundation for the quantitative content analysis of the project's curriculum intervention.

Sampling

Sampling was purposive at the instructor level before the intervention phase. At a further stage, the research team decided to exclude all courses with a primary focus on teaching technology (ICT, computer science, or digital education). The intervention focused exclusively on courses from non-technological disciplines, to better assess how digital competencies are integrated into general subject teaching practices and in line with one of the project's core objectives - to explore how digital competencies are integrated across social sciences.

To explore how academic staff experienced the integration of digital competencies into higher education curricula, an instructor questionnaire was developed within the framework of the Homo Digitalis project.

The questionnaire

The questionnaire (see Annex 1) clusters into two coherent constructs: Individual Readiness (familiarity, preparedness, guidance) and Collaborative Support (collaboration, idea-sharing). Together, they explain how digital competencies are integrated at both the personal and the institutional level.

The instrument was administered to lecturers directly involved in syllabus revision and was structured around three key dimensions: readiness, collaboration, and external engagement. The first section gathered demographic information, specifically years of teaching experience, to contextualize responses; the second dimension, Readiness, focused on instructors' familiarity with digital competencies prior to the project and their perceived preparedness to embed these skills into revised syllabi; the third dimension, Collaboration

and Support, examined collegial exchange and whether such cooperation improved the quality of the revisions. Finally, the questionnaire asked about External Engagement, addressing whether partners such as industry, civil society, universities, or pre-university institutions were consulted. Overall, the instrument provides insight into how academic staff perceive their own capacities, the support they received, and the broader network involved in curriculum transformation.

LIMITATIONS OF THE PILOT STUDY

As a pilot phase, the study is exploratory in nature and subject to important limitations. The questionnaire was completed by 14 instructors, while the focus group included 7 participants. Although this small sample size does not allow for broad generalizations, it provides valuable preliminary insights into instructors' preparedness, institutional support, and the challenges of integrating digital competencies into non-technological disciplines.

RESULTS

First research question: What was the level of the Instructor preparedness?

For the purposes of this study, a questionnaire consisting of seven questions was designed to evaluate instructors' self-efficacy in digital skills. Six of these items were measured using a five-point Likert scale, requiring respondents to provide an evaluative rating. Question 7, by contrast, was a dichotomous item with yes/no response options; in cases where respondents answered yes, they were additionally asked to select from a predefined list of offerings. The Cronbach's Alpha value for all items was observed as 0.83. The questionnaire was administered to 14 academic staff members (respondents) from partner universities in the Western Balkans, specifically in Albania, Kosovo, North Macedonia, and Bosnia and Herzegovina. It was distributed online via Google Forms, and the data collection period extended over two months during the spring semester of the 2024–2025 academic year (see Annex 4). According to the project's design, by this stage the number of syllabi integrating digital competencies was expected to reach 38. However, as in several partner institutions the procedures for syllabus revision required considerable time, the present dataset primarily reflects the staff perspectives from three higher education institutions from Albania, Kosovo and Bosnia and Herzegovina. Nonetheless, this outcome still represents a significant level of achievement relative to the implementation timeline. Fig. 1 presents the demographic data regarding respondents' years of teaching experience. Among the 14 academic staff members who completed the questionnaire, the largest group (50%) reported between 11 and 20 years of teaching experience. Early-career instructors with 4–10 years of experience made up 28.6% of the sample, while those with 0–3 years accounted for 14.3%. Only a small proportion of respondents (7.1%) reported more than 21 years of experience. This distribution indicates that the majority of participants were mid-career academics, with substantial professional experience, offering a balanced perspective between newer and more senior staff.

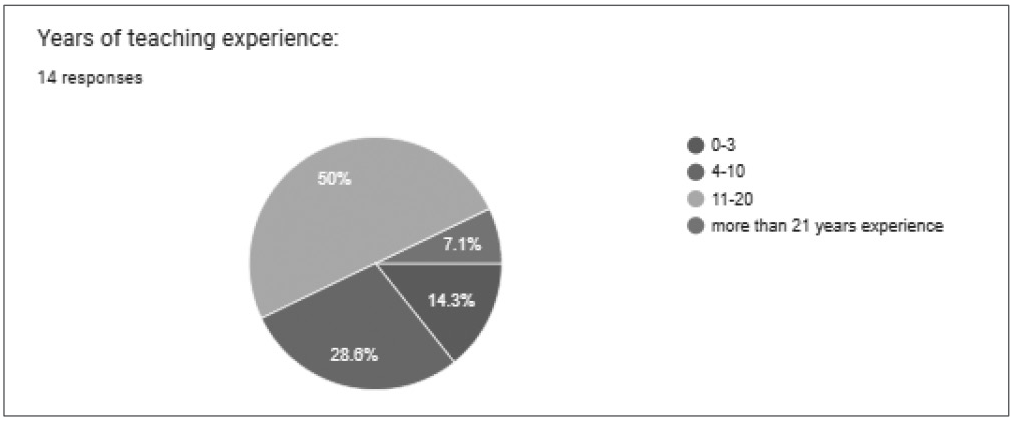


Fig. 1 Demographic data regarding respondents' years of teaching experience

Early-career academics (0–3 years) reported the highest levels of familiarity and preparedness, while staff with 4–10 years of experience also showed strong preparedness but slightly lower training scores. The largest group (11–20 years) rated themselves moderately familiar and prepared, despite receiving training comparable to other groups. Notably, the most senior staff (21+ years) reported the lowest preparedness, even though they rated the training they received as adequate. These results highlight a generational gap, with early-career academics driving digital integration, while mid- and late-career staff may require additional tailored support to strengthen their digital confidence and application in curricula.

Fig. 2 presents the responses of instructors regarding their familiarity with digital competencies before the syllabus revision process. The majority of respondents (42.9%) rated their familiarity as moderate, while 28.6% considered themselves to have a very high

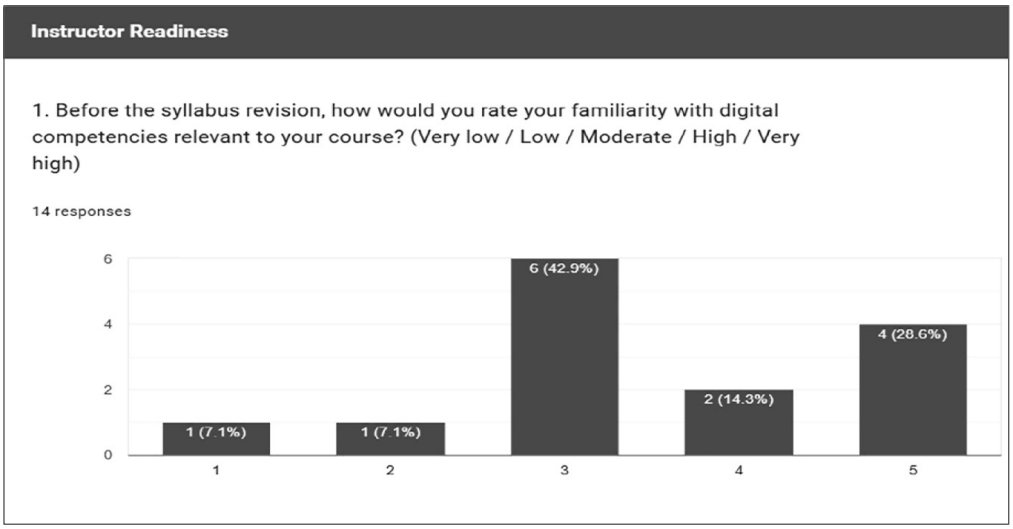


Fig. 2. Instructor Readiness Before Syllabus Revision

level of familiarity. Smaller groups of instructors assessed their readiness as high (14.3%), low (7.1%), or very low (7.1%). These results suggest that, prior to the curriculum revision, most participants were situated at a middle level of digital competence, with a notable proportion already reporting strong confidence. This distribution indicates both a solid basis for integrating digital skills into syllabi and the presence of diverse levels of preparedness among academic staff. Other statistical data: Count (N): 14; Mean: 3.50; Median: 3.0.

While Fig. 3 shows that most instructors felt adequately prepared to integrate digital competencies into their syllabi (64.3% either agreed or strongly agreed), the concept of preparedness should be interpreted more broadly. Technical familiarity with digital competencies (see Fig. 2) appears to have translated into practical readiness for syllabus revision, but successful integration also depends on pedagogical preparedness. Pedagogical preparedness involves the ability to redesign learning outcomes, adapt teaching strategies, and align assessment practices to make effective use of digital tools. Instructors who rated themselves less confident may not only have lacked technical skills but also the didactic strategies required to embed digital competencies meaningfully into course delivery. This suggests that professional development should go beyond technical training to include pedagogical models for digital integration, such as blended learning design, student-centered use of technology, and digital assessment practices. Thus, while Fig. 3 confirms encouraging levels of self-reported readiness, the results should be interpreted in light of the broader teaching mission: digital competence is valuable only when paired with pedagogical intentionality.

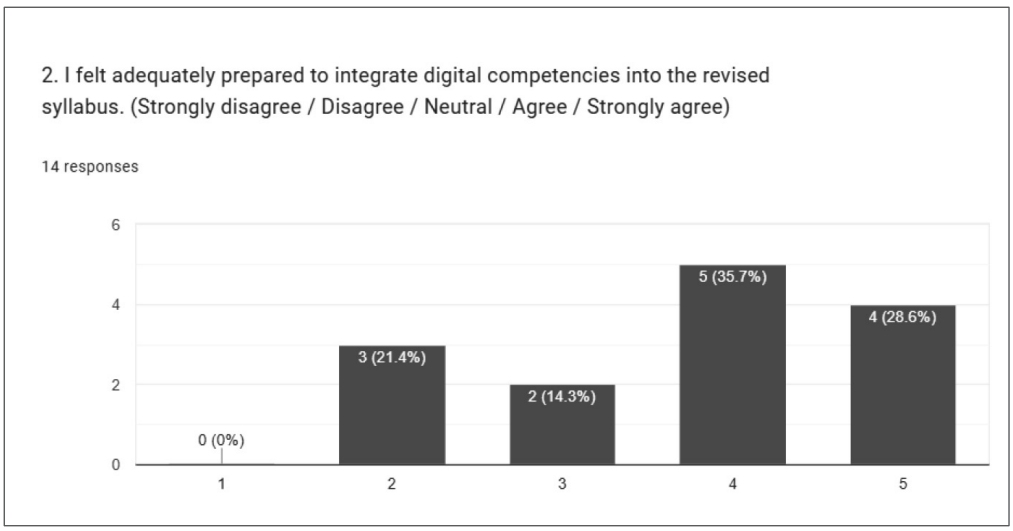


Fig. 3. Instructor preparedness to integrate digital competencies (distribution of responses to this statement: N=14)

The data highlight the importance of supporting staff in both areas, ensuring that integration of digital skills is not simply a technical exercise but also an educational transformation. The responses shown in Fig. 3, where most instructors felt prepared

to integrate digital competencies into their teaching, should be considered not only as a reflection of technical readiness but also of pedagogical preparedness. Integration of digital tools is effective only when instructors are able to translate them into teaching strategies, learning activities, and assessment practices that align with educational goals. In this respect, the findings are directly connected to the experience of the MAGNET project, implemented at the same partner HEIs in the Western Balkans. MAGNET's primary emphasis was on strengthening pedagogy in higher education, particularly through professional development, mobility, and collaborative learning.

By exposing staff to innovative pedagogical models and encouraging reflection on teaching practices, MAGNET helped create an enabling environment in which digital competencies could later be embedded more meaningfully into curricula. Thus, the sense of preparedness reported by the instructors in this study can be understood as the cumulative effect of capacity-building interventions across projects. The current project builds upon the pedagogical foundations laid by MAGNET, highlighting how interlinked initiatives reinforce each other to foster sustainable change in higher education teaching practices across the region.

Fig. 4 shows how instructors evaluated the adequacy of the guidance and training they received for syllabus revision. The majority of respondents reported positive experiences: 35.7% rated the support as *high* and an equal 35.7% as *very high*. A further 14.3% rated the training as *moderate*. By contrast, smaller groups expressed dissatisfaction, with 7.1% reporting *very low* and another 7.1% *low* levels of support.

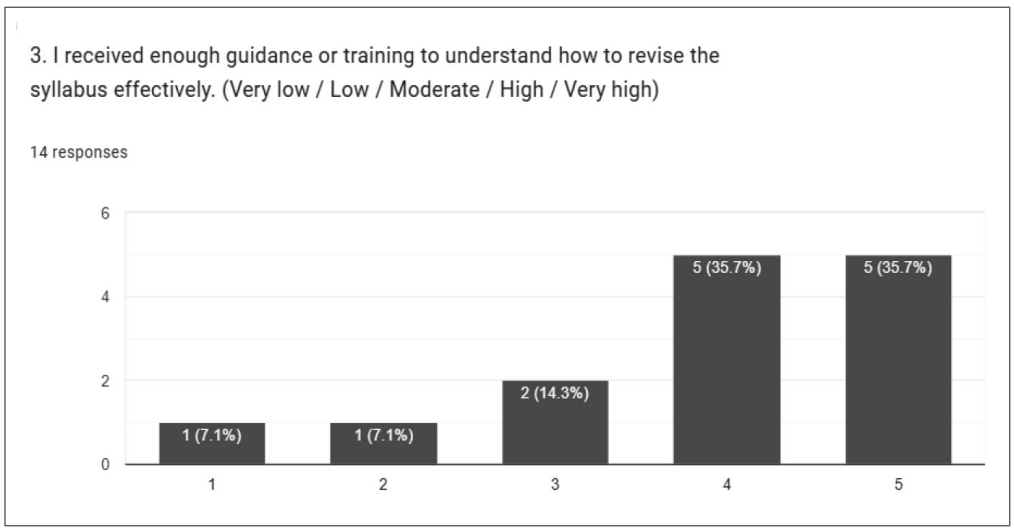


Fig. 4. Guidance and Training for Syllabus Revision
(distribution of responses to this statement: N=14)

Fig. 5 presents instructors' responses regarding collaboration during the syllabus revision process. A large proportion of respondents rated their collaboration at the moderate level (42.9%), while 28.6% reported high collaboration and another 28.6% reported *very*

high collaboration. Importantly, no respondents indicated *very low* or *low* collaboration, suggesting that some level of collegial exchange was universally present.

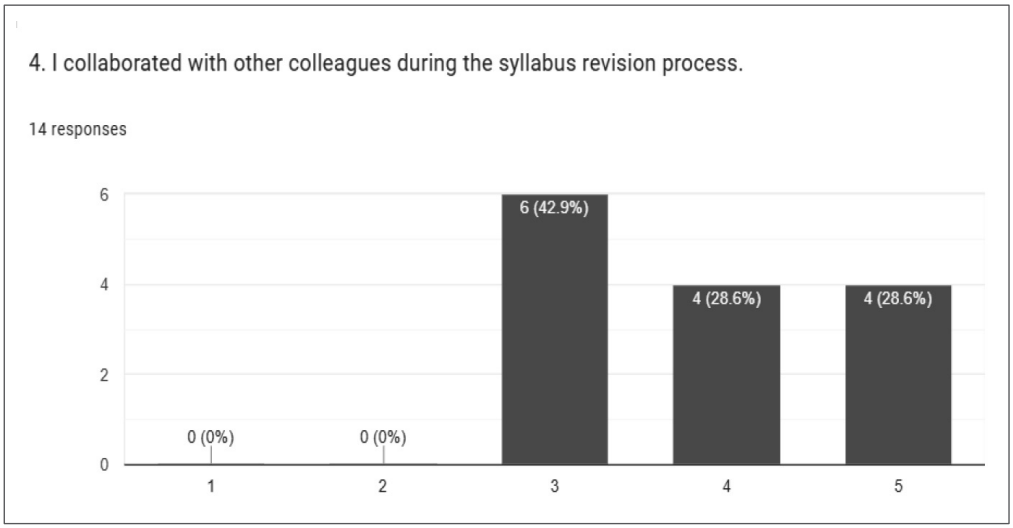


Fig. 5. Collaboration with Colleagues During the Syllabus Revision Process (distribution of responses to this statement: N=14)

Fig. 6 shows how instructors evaluated the impact of collegial exchange on the quality of syllabus revisions. A combined 71.4% of respondents rated the effect positively**,** with 35.7% selecting *agree* and another 35.7% selecting *strongly agree*. A smaller group (28.6%) remained *neutral*, while no respondents disagreed or strongly disagreed.

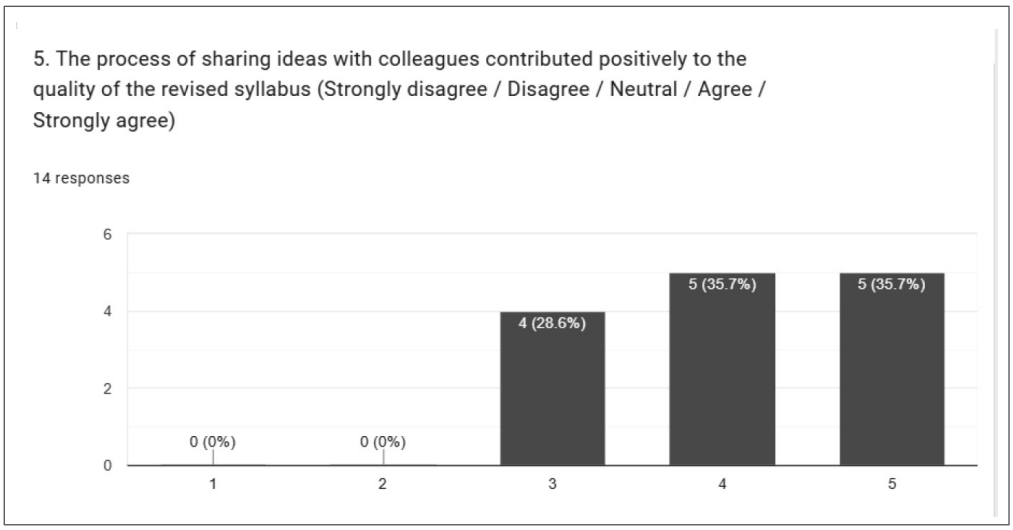


Fig. 6. Perceived Contribution of Sharing Ideas with Colleagues to Syllabus Quality (distribution of responses: N = 14)

Fig. 7 presents data on the extent to which instructors involved external partners during syllabus revision. Out of 14 respondents, 64.3 % reported engaging external partners, while 35.7 % did not. Among the nine respondents who collaborated externally, the partnerships were distributed across several stakeholder groups: industry/business (33.3 %), educational institutions at pre-university level (33.3 %), civil society/NGOs (22.2 %), and other universities (11.1 %).

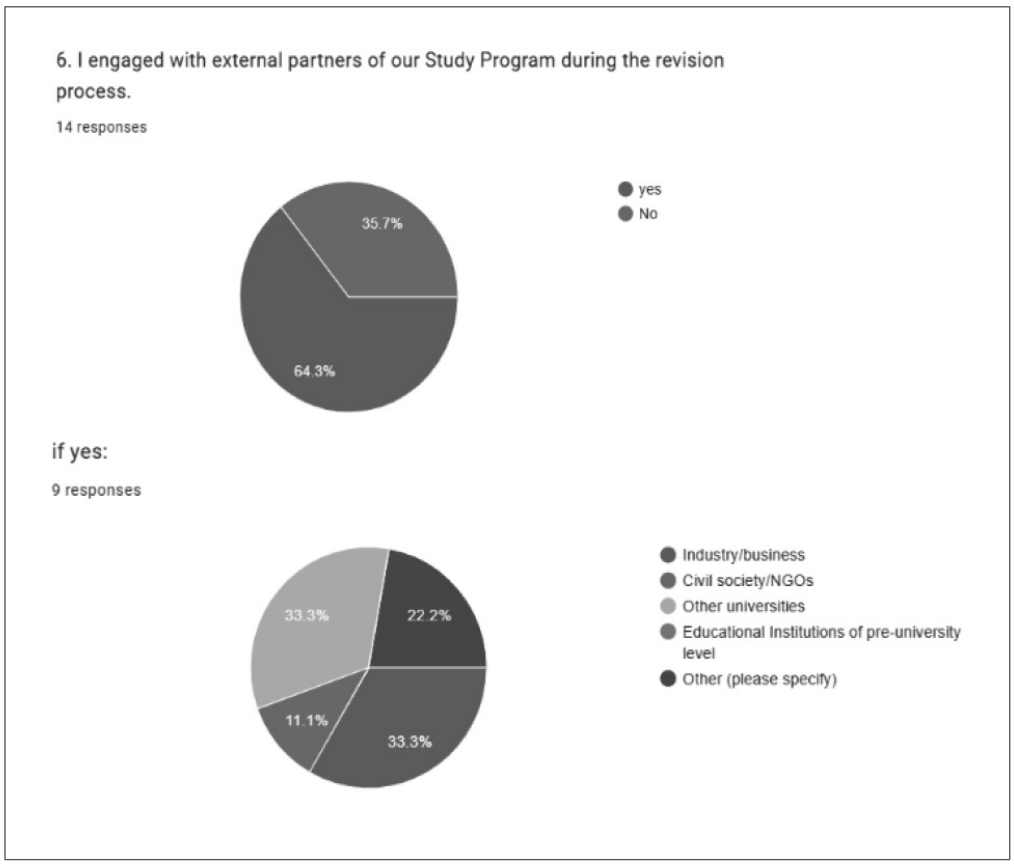


Fig. 7. Engagement with External Partners During the Syllabus Revision Process (distribution of responses to this statement: N=14)

Second research question: What was the level of the integration of digital competencies at each of the elements of the revised syllabus?

The analysis revealed that instructors at LOGOS University College often did not adequately reflect digital resources in their syllabi. In the revised syllabuses, the integration of competencies shows a disconnection between generic and specific skills. While generic competencies are broadly defined, their translation into discipline-related specific competencies is inconsistent. Although references to digital competencies were sometimes included in generic or specific competencies, these were rarely translated into course

content and never into assessment methods. Redecker and Punie (2017, p. 26) highlight assessment strategies using digital technologies for formative and summative assessment; however, none of these strategies are included in any of the revised social sciences curricula. This absence points to a significant gap and underscores the need for future curricular development to embed digital assessment practices as an integral part of teaching and learning. Addressing this absence should be a priority for future curricular development, ensuring that digital assessment practices become an integral part of teaching and learning in line with international best practices.

Third research question: What was the challenges of instructor during the process of integration of digital competencies and the implementation of revised course?

Qualitative Findings from the Focus Group

In addition to the survey results, a focus group with academic staff from the HEI highlighted several pressing challenges in the integration of digital competencies.

- Students' Limited Preparedness

Participants noted that many students are insufficiently prepared for digital learning. This challenge is particularly pronounced among those coming from low socio-economic backgrounds or remote areas, where access to reliable infrastructure and prior exposure to digital tools is limited.

- Working Students and Time Constraints

In several study programs, students simultaneously work and attend higher education. In such contexts, the use of digital applications and online platforms often leads to early disengagement. Balancing professional responsibilities with academic tasks leaves little time to develop new digital competencies outside of the classroom.

- Limited Access to Equipment

A recurring problem identified was the lack of personal devices. Many students do not own a suitable laptop or computer and often rely on outdated equipment or even borrow devices from family members (e.g., their children's laptops). As a result, digital tools are mainly used only during in-person classroom hours in institutional auditoriums, limiting their integration into independent study.

- Need for Instructor Training

Staff also stressed the importance of further training for instructors. While many are motivated to adopt digital tools, they lack the structured opportunities and institutional support to update their competencies, which hinders the effective transfer of digital skills to students.

- Discrepancy Between Discourse and Syllabus Integration

A significant concern was the disconnect between what instructors claim about integrating digital competencies and the actual content of their syllabi. While instructors frequently articulate the importance of digitalization, this emphasis is not always reflected in course design, learning outcomes, or assessment strategies. This inconsistency weakens the institutional impact of digitalization efforts.

DISCUSSIONS AND CONCLUSIONS

The study examined the readiness of academic staff in the Western Balkans to integrate digital competencies into teaching. The questionnaire included six Likert-scale items and one conditional yes/no item, enabling a structured evaluation of attitudes, preparedness, and institutional practices. Reliability analysis confirmed internal consistency of the scale (Cronbach's $\alpha = .82$), demonstrating that the items consistently measured perceptions of digital readiness. Results show that academic staff broadly recognize the importance of digital competencies but differ in their level of preparedness. While some report confidence and experience in using digital tools - supported by training and access to infrastructure - others remain at an initial phase of adoption. Although these responses reflect individual perspectives, they indirectly signal the varying levels of institutional support across HEIs.

When the demographic distribution (see Fig. 1) is compared with instructors' self-assessment of digital competencies before syllabus revision (see Fig. 2), an interesting pattern emerges. The majority of respondents were mid-career academics with 11–20 years of teaching experience (50%). This same group also represented the largest share of those who rated their digital competence as moderate or high. By contrast, early-career instructors in some years (0–3 years and 4–10 years combined, 43% of respondents) were more evenly distributed across the lower and higher ends of the scale, with some reporting very low familiarity and others very high familiarity. Senior staff (21+ years, 7.1%) were underrepresented and tended to place themselves at the lower end of readiness.

This comparison suggests that mid-career instructors, who form the core of the teaching body, entered the revision process with a balanced but cautious confidence in their digital competencies. Early-career academics demonstrated more polarized results, reflecting both stronger digital skills among younger staff and gaps in training for some. Overall, the data highlight the need for differentiated professional development strategies that support both less experienced and senior staff while consolidating the capacities of the mid-career majority.

Correlation analysis confirmed notable differences between individual and collaborative aspects of digital competence. A very strong positive correlation was found between Item "Before the syllabus revision, how would you rate your familiarity with digital competencies relevant to your course?" and Item "I felt adequately prepared to integrate digital competencies into the revised syllabus" ($r = 0.88$, $p < .001$), indicating that academic staff who reported higher confidence in one individual skill also tended to rate themselves highly in the other. By contrast, the correlation between Item "I collaborated with other colleagues during the syllabus revision process" and Item "I felt adequately prepared to integrate digital competencies into the revised syllabus" was weaker and statistically non-significant ($r = 0.35$, $p = .23$), suggesting that collaboration with colleagues does not strongly align with individual digital preparedness. These results highlight that, within the current context, staff perceptions of digital readiness are shaped more by individual competencies than by collaborative practices, pointing to the need for institutions to better integrate teamwork and peer-support structures into digital capacity building.

The focus group findings resonate with the survey correlations: individual competencies appear stronger than collaborative practices, but both students and staff face structural barriers (socio-economic inequalities, time constraints, equipment shortages). Moreover, the gap between discourse and practice confirms that institutional strategies for digitalization require not only personal motivation but also a consistent curricular framework. Together, the results suggest that policy interventions should address both sides: strengthening individual staff training and ensuring systemic support for students to reduce digital divides.

In the revised courses, digital competencies are mentioned only as a sub-element within broader categories of competencies, rather than being recognized as a core transversal concept. This absence of explicit framing hinders their systematic development—from generic awareness, such as digital literacy, online communication, and ethical use, to discipline-specific applications, including subject-relevant tools, research databases, data visualization, and digital collaboration platforms.

The HOMO DIGITALIS project and its initiative to integrate digital competencies into the social sciences curricula represent a valuable starting point for embedding such skills in higher education. However, this process must be carried out in a structured and organized manner, fully aligned with study programs. Following the piloting phase with university colleagues in Albania and Bosnia and Herzegovina, the project aims to expand the scope of this study to include all partner institutions. A key recommendation is to revise the formulation of generic and specific competencies in the social sciences, ensuring they are interconnected and mutually reinforcing rather than treated as separate educational aims. This process should be undertaken in close cooperation with educational institutions, accreditation agencies, and employers, who serve as partners in the development of study programs.

HEIs in the Western Balkans are in a transitional stage—motivated to adopt digital competencies but requiring stronger systemic and policy-level support. Institutional policies, targeted training, and adequate infrastructure are key levers of successful integration of digital competencies. Statistical evidence confirms that progress in one dimension (e.g., training) is closely linked to progress in others (e.g., confidence), reinforcing the need for a comprehensive approach. Cross-project collaboration (MAGNET, HOMO DIGITALIS, Erasmus+ initiatives) offers a sustainable platform for scaling up digital transformation in the region. Ultimately, the findings suggest that technology alone is insufficient: pedagogical vision, institutional commitment, and regional cooperation are decisive for long-term impact.

ETHICS STATEMENT

The study was undertaken within the context of Albanian HEIs, with all participants providing written consent and being fully informed of the study's aims and dissemination. The authors safeguarded the confidentiality and privacy of participants in line with research integrity and autonomy. No identifiable data were collected, and there is zero risk of attributing responses to specific individuals. Only the authors had access to participants' data.

The HOMO DIGITALIS project emphasizes equal opportunities, inclusiveness, and respect for diversity as core EU values. Participation in project activities (training, surveys,

piloting, dissemination) is entirely voluntary and based on informed consent. Special care is taken to include and support underrepresented groups in the Western Balkans, including those with limited digital skills, ensuring that no participant is disadvantaged. All procedures are reviewed by the responsible ethics structures of partner institutions.

REFERENCES

Castañeda, L., & Selwyn, N. (2018). More than tools? Making sense of the ongoing digitizations of higher education. *International Journal of Educational Technology in Higher Education*, *15*(1), 22.

Economou, A., Kapsalis, G., & Brolpito, A. (2024). Supporting national strategies on teachers' digital competence through the use of SELFIEforTEACHERS: the case of Albania and North Macedonia.

European DIGITAL SME Alliance, *A New Digital Agenda for the Western Balkans* (discussion paper launch, October 11, 2023), European DIGITAL SME Alliance, accessed [today's date], https://www.digitalsme.eu/events/a-new-digital-agenda-for-the-western-balkans/

Falloon, G. (2020). From digital literacy to digital competence: the teacher digital competency (TDC) framework. *Educational technology research and development*, *68*(5), 2449-2472.

Ghomi, M., & Redecker, C. (2019, May). Digital Competence of Educators (DigCompEdu): Development and Evaluation of a Self-Assessment Instrument for Teachers' Digital Competence. In *CSEDU (1)* (pp. 541-548).

Levkov, N., & Kitanovikj, B. (2024). The importance of digital skills for the Western Balkans-comparative analysis between the Western Balkans and the European Union. *Economy, Business and Development: An International Journal*, *5*(1), 28-43.

Lund, A., Furberg, A., Bakken, J., & Engelien, K. L. (2014). What does professional digital competence mean in teacher education? *Nordic journal of digital literacy*, *9*(4), 280-298.

Masoumi, D., & Bourbour, M. (2024). Framing adequate digital competence in early childhood education. *Education and Information Technologies*, *29*(15), 20613-20631.

Peters, M., Ejjaberi, A. E., Martínez, M. J., & Fàbregues, S. (2022). Teacher digital competence development in higher education: Overview of systematic reviews. *Australasian Journal of Educational Technology*, *38*(3), 122-139.

Quast, J., Rubach, C., & Porsch, R. (2023). Professional digital competence beliefs of student teachers, pre-service teachers and teachers: Validating an instrument based on the DigCompEdu framework. *European Journal of Teacher Education*, 1-24.

Redecker, C., & Punie, Y. (Eds.). (2017). European framework for the digital competence of educators: DigCompEdu. Publications Office of the European Union. https://doi.org/10.2760/159770

Skantz-Åberg, E., Lantz-Andersson, A., Lundin, M., & Williams, P. (2022). Teachers' professional digital competence: An overview of conceptualisations in the literature. *Cogent Education*, *9*(1), 2063224.

Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education*, Vol. 50/1, pp. 37-56, https://doi.org/10.1080/0305764X.2019.1625867.

Starkey, L., & Yates, A. (2020, April). How do student teachers learn professional digital competence? *In Society for Information Technology & teacher education international conference* (pp. 1876-1882). Association for the Advancement of Computing in Education (AACE).

ANNEX 1 INSTRUCTOR QUESTIONNAIRE

Project: *HOMO DIGITALIS – Bridging the Digital Humanities and Educational Media Divide in the West Balkans*
Target group: Lecturers who have revised the syllabus

Dear Instructor,
The purpose of this questionnaire is to gather your perspective on the revised course syllabus you were involved with. We are particularly interested in your level of preparedness during the revision process, any collaboration you had with colleagues or external partners, and your reflections on the quality and relevance of the revisions regarding the integration of digital competencies. Your input is valuable and will help us evaluate and improve future course development efforts. Thank you for your contribution!

Background Information
1. Years of teaching experience: 0-3; 4-10; 11-20; 20+

Section 1: INSTRUCTOR READINESS
2. Before the syllabus revision, how would you rate your familiarity with digital competencies relevant to your course?
   Very low Low Moderate High Very high

3. I felt adequately prepared to integrate digital competencies into the revised syllabus.
   Strongly disagree Disagree Neutral Agree Strongly agree

4. I received enough guidance or training to understand how to revise the syllabus effectively.
   Strongly disagree Disagree Neutral Agree Strongly agree

Section 2: COLLABORATION AND SUPPORT
5. I collaborated with other colleagues during the syllabus revision process.
   Not at all To a small extent To some extent To a great extent

6. The process of sharing ideas with colleagues contributed positively to the quality of the revised syllabus.
   Strongly disagree Disagree Neutral Agree Strongly agree

7. I engaged with external partners of our Study Program during the revision process.
   Yes No

If yes, please specify the type of external partner(s) involved: Industry/business Civil society/NGOs Other universities Educational Institutions of pre-university level Other (please specify): _____

ANNEX 2 COURSES REVISED TO INTEGRATE DIGITAL COMPETENCIES AT LOGOS UNIVERSITY COLLEGE IN THE FRAMEWORK OF HOMO DIGITALIS PROJECT

Level of study	No	Study Program	No	Course	1. Professional Engagement	2. Digital Resources	3. Teaching & Learning	4. Assessment	5. Empowering Learners	6. Facilitating Learners Digital Competence	Total Score	Comments
Bachelor in	I	Teacher Training for Pre-School Education	1	Albanian History								
			2	Digital Education							0	To be excluded
			3	Visual_Arts & Didactics								
	II	Social Work	4	Computer Usage							0	To be excluded
			5	Research Methods								
	III	Greek Language & Civilization	6	Greek Art and ICT								The intervention was planned but not yet implemented during the study phase
Master of Science in	IV	Religious Tourism	7	Geographic information systems in tourism								
	V	Master of Science in Professional Translation	8	Translation of Specific Texts & Terminological Documentation II								

ANNEX 3 DIGITAL RESOURCES IN THE SYLLABUS (SCORING METHOD)

Syllabus element	0 Not Present	1 Implied Only	2 Mentioned Briefly	3 Basic Implementation	4 Fully Integrated
1. Competencies					
2. Course Content					
3. Assessment					

ANNEX 4 INSTRUCTOR QUESTIONNAIRE

	Years of teaching experience:	1. Before the syllabus revision, how would you rate your familiarity with digital competencies relevant to your course?	2. I felt adequately prepared to integrate digital competencies into the revised syllabus	3. I received enough guidance or training to understand how to revise the syllabus effectively	4. I collaborated with other colleagues during the syllabus revision process.	5. The process of sharing ideas with colleagues contributed positively to the quality of the revised syllabus	6. I engaged with external partners of our Study Program during the revision process.	if yes:
1	11-20 years	1	2	2	3	3	No	N/A
2	0-3	5	5	5	5	5	yes	N/A
3	11-20 years	3	3	5	5	5	No	N/A
4	more than 21 years' experience	3	2	4	4	5	yes	Other universities
5	11-20 years	5	5	5	4	4	yes	Other universities
6	4-10 years	3	3	1	3	4	yes	N/A
7	11-20 years	3	4	4	5	5	yes	Industry/ business
8	11-20 years	3	4	5	4	4	yes	Industry/ business
9	11-20 years	2	2	3	3	3	No	N/A
10	4-10 years	5	5	4	3	3	No	N/A
11	11-20 years	4	4	4	4	4	yes	Industry / business
12	0-3	4	4	3	3	3	yes	Other universities
13	4-10 years	5	5	4	5	5	No	N/A
14	4-10 years	3	4	5	3	4	yes	Civil society/ NGOs

ENHANCING LEARNING THROUGH MULTIMEDIA CULTURAL HERITAGE APPLICATIONS

Managing Cognitive Load

Merima **MUSLIĆ***, Dušanka **BOŠKOVIĆ**
Vensada **OKANOVIĆ**, Selma **RIZVIĆ**

University of Sarajevo, Sarajevo, Bosnia and Herzegovina
*Corresponding Author: e-mail: merimazukic@gmail.com / merima.zukic@ff.unsa.ba

Abstract

The paper presents possibilities of enhancing the education by using multimedia applications, but with respect to managing Cognitive Load (CL) linked to these applications. The case study used for evaluation is based on multimedia application of digital cultural heritage, specifically the site of White Bastion fortress in Sarajevo, Bosnia and Herzegovina. The research question is focusing on the use of Cognitive Load Theory as a cornerstone for benchmarking levels of immersion and edutainment in User eXperience (UX). In our research we would like to establish a straightforward and simple way of measuring UX in multimedia cultural heritage applications aimed for education. Being aware of limitation of such simplified approach, our objective is not to elaborate qualities and drawbacks of such applications but to provide developers with simple measure of their success. Such measurement is instrumental in comparison of different applications or different versions of an application. In addition to general aspects of usability we focus on specific objectives of multimedia cultural heritage applications: immersion and edutainment; important concepts for successful usage of multimedia in education.

Keywords: multimedia, multimedia in education, immersion, edutainment, digital cultural heritage

ABOUT THE AUTHORS

MERIMA MUSLIĆ

Assistant professor at the Department of Pedagogy of the Faculty of Philosophy, scientific field: Psychology and Methodology of education research, University of Sarajevo, Sarajevo, Bosnia and Herzegovina. Professional interests include: educational psychology, applied cognitive psychology, statistics, counseling and professional orientation. She is a member of the expert team that runs the Office for support for UNSA students.

DUŠANKA BOŠKOVIĆ

Vice Rector for Quality at the University of Sarajevo and a Professor at the Faculty of Electrical Engineering. Her research interests and teaching are focused on software engineering in biomedical and cognitive domains. She is highly motivated to learn about problem domains and committed to achieving a high level of user experience. In addition to teaching and research, she is engaged in various activities aimed at improving education in Bosnia and Herzegovina, especially through promoting student-centered and outcome-based learning and using software as educational content.

VENSADA OKANOVIĆ

Vensada Okanovic has finished her BSc, MSc and PhD studies at the University of Sarajevo, Faculty of Electrical Engineering, where she is a professor. Her expertise and research interests are in the fields of web and mobile applications development, software engineering, web technologies and graphics programming. She is an active collaborator of Sarajevo Graphics Group and co-author of their projects and publications.

SELMA RIZVIĆ

Professor of Computer Graphics at the Faculty of Electrical Engineering, University of Sarajevo. For 23 years she has been teaching there at Bachelor, Masters and PhD study programs. From 2005-2010 she has been engaged as well at the Sarajevo School of Science and Technology, where she established computer graphics courses and Digital Media Center laboratory. At the University of Sarajevo, she founded in 2004 the Laboratory for Computer Graphics - Sarajevo Graphics Group. It is a research group that specializes in the use of 3D technologies for the presentation of cultural heritage. The SGG research group is multidisciplinary, it includes computer graphics experts and works with archaeologists, historians, visual artists, writers, film professionals, in order to design and implement virtual cultural heritage applications which have both educational value and are engaging, entertaining and attractive at the same time.

INTRODUCTION

Multimedia cultural heritage applications bring within digital reach of wider public audience interesting and important historic sights. Through virtual visits, augmented reality and serious games users are immersed in otherwise unreachable world and educated and entertained throughout the process.

In our research we address usability factors specific for multimedia cultural heritage applications, and look beyond standard usability principles as learnability, consistency, feedback, etc. However, our objective is to develop a simple and efficient instrument to measure users' perception of the usability of multimedia cultural heritage applications. We would like to provide developers with a benchmark – "a single, standardized and summated score for analyzing and reporting usability metrics" (Sauro and Kindlund, 2005).

According to Wiberg and Jegers (2003) factor important to both entertainment and education is immersion, as a measure of absorption and engagement with the virtual multimedia environment, challenging for evaluation with the standard user testing methods. Important aspect of entertainment in educational applications is to create a motivating and successful environment for learning which introduces a new combined factor: edutainment.

Fig. 1. White Bastion fortress, Sarajevo, Bosnia and Herzegovina

Using multimedia in education

The integration of multimedia in education had significantly changed the way students engage with complex and diverse subjects, offering immersive and interactive experiences that traditional methods cannot provide. Multimedia enables students to see what otherwise would not be possible, either it is not existing any more, it is not reachable or not visible. In the context of digital heritage, multimedia applications play a crucial role in making cultural and historical content more accessible and engaging for a wide audience. By combining visual, auditory, and storytelling elements, multimedia tools enable deeper understanding and retention of heritage information, fostering a more meaningful learning experience.

As technological advancements continue to evolve, the use of multimedia applications in cultural heritage education has become increasingly important for promoting awareness, appreciation, and preservation of rich cultural legacies. It is especially important for cultural heritage reconstructed in multimedia applications or inaccessible to learners community due to different reasons.

Multimedia applications offer significant benefits for education, but they also introduce new cognitive challenges that can influence learning effectiveness. The concept of cognitive load refers to the amount of mental effort required to process information within working memory. When multimedia content is poorly designed or with unfriendly and complex user interface, it can overload learners' cognitive capacity, leading to reduced understanding and retention. Managing cognitive load is therefore essential for designing effective multimedia educational applications, particularly in the context of digital heritage, where historical, cultural, and visual information needs to be conveyed in a way that supports, rather than hinders, learning.

Measuring immersion and edutainment

Evaluation of user experience for multimedia cultural heritage applications has specific significance, since assessing effectiveness and efficiency is inseparable of user perception of the benefits of engagement with the application. While discussing measurement of user experience we need firstly to answer two basic questions: "What" we would like to measure, and afterwards "How" we plan to measure. Rationale for the measurement is not less important, to answer the question "Why" we get engaged in the process of measurement at all.

Measuring user experience with multimedia cultural heritage applications is linked to measuring immersion and edutainment. Weibel and Weissmath (2011) have considered spatial presence and flow as key concepts to explain immersive experiences. They concluded that immersive experiences can be divided into spatial immersion (presence) and immersion in the task (flow), examining the relation between presence and flow, concluding that these are distinct constructs. R. Paiva de Oliveira, D.C. Paiva de Oliveira and Tavares (2016) measure immersion mainly with objective of evaluating narrative of a game, and look for different dimensions of the immersion. Jenett, Cox, Cairns, Doparee, Epps, Tijs and Walton (2008) present a very thorough and detailed review on methods used to evaluate concepts of immersion, engagement, flow and presence, as concepts used to describe the perceived quality of the interaction with digital media and games. This research is addressing the question "How" to measure, and the authors emphasized the ambiguity of subjective emotional phenomena and focused on measurable objective concepts, what they call rational phenomena like the player's performance and biological phenomena: physiological measurements as galvanic skin resistance.

In the area of multimedia applications both for education and digital heritage presentation authors notice lack of evaluation tools. Methods for evaluation of multimedia applications commence with identification of attributes to be measured Botchini and Garzotto (2007), often referred to as heuristics, and classified in groups or dimensions

of evaluation. Developing an evaluation framework for multimedia cultural heritage applications is a challenging process due to involvement of multidisciplinary dimensions including: interaction and design for multimedia applications, pedagogy and cognitive theory, content related heuristics involving history, archeology, arts, and etc.

Difficulties in discussing and measuring edutainment arise from opposition between the important pedagogical aspects and aspects of importance for the entertainment part of the content presentation (Wilberg and Jegers 2003).

Edutainment is not a novel attribute in designing educational applications, but the importance of edutainment is especially recognized in the research field of serious games and digital cultural heritage presentations (Sweller, 1994). Effectiveness of these applications can be measured directly in terms of acquired knowledge. One of common misconceptions linked to multimedia material usage in education is that is effective mainly because it increases motivation and that learners are more motivated to engage with multimedia material which fosters their learning (Prinz, Kollmer, Flick, Renkl, Eitel, 2022).

Measuring entertainment and its influence on learning outcomes achievement is not a straightforward process. In assessing the edutainment influence on successful learning it is useful to include measurements which take into account Cognitive Load Theory (Leppink, Paas, Van der Vleuten, Van Gog, Merrienboer, 2013. and Kirakowaki, Corbett, 1993). The results of applying this qualitative approach in evaluating White Bastion 4D model is described in the Section 4.

The complexity of usability analysis makes usability data hard to digest and it is difficult for designers and developers to compare the relative usability of different features or products (Sauro and Kindlund, 2005). Maintaining the balance of focus in the multidisciplinary team is not easy, because of their difference in priorities. Psychologists are focused on purity of methodology with objective to reach general and standard conclusions, and computer science professionals are asking for specific and particular technical improvements (Lazar, Feng, Hochheiser, 2010). Designers and developers are looking for substantial informative feedback. For this reason, this interdisciplinary approach is sometimes misunderstood by professionals from both feeds, as they feel that on one hand it does not meet scientific criteria (psychologist) and on the other does not offer plan that is concrete enough for intervention (developers). However, we argue that combining psychological theoretical framework and research methodology with problem solving focus and IT tools is necessary for both fields to advance.

Example of a more quantitative oriented evaluation can be found work of Schrepp, Hinderks and Thomaschewski (2017) where authors have described the instrument to be used to calculate a general satisfaction score, as well as for the evaluation of products. It is a 50 items Likert-type questionnaire, which is named Software Usability Measurement Inventory - SUMI. This questionnaire is made up of five sub-scales, where each sub-scale is represented by 10 items. It has been developed to provide a standardized measurement of user satisfaction with software. The web version of the SUMI questionnaire is available and used for years by developers and academia, building up a large repository of survey results.

White Bastion 4D presentation

White Bastion is a fortress above old town of Sarajevo, Bosnia and Herzegovina (see Fig. 1). In some historical moments it was a part of city walls. Archaeological excavation of the site has shown remains of various strata, dating from medieval till Austrian Hungarian period of Sarajevo past. Online application consists of 10 digital stories, 6 interactive virtual environments depicting the assumed appearances of the fortress in different time periods, as well as digitization and virtual reconstruction of artifacts found on the site during excavation, at the moment kept in the Museum of Sarajevo's depo.

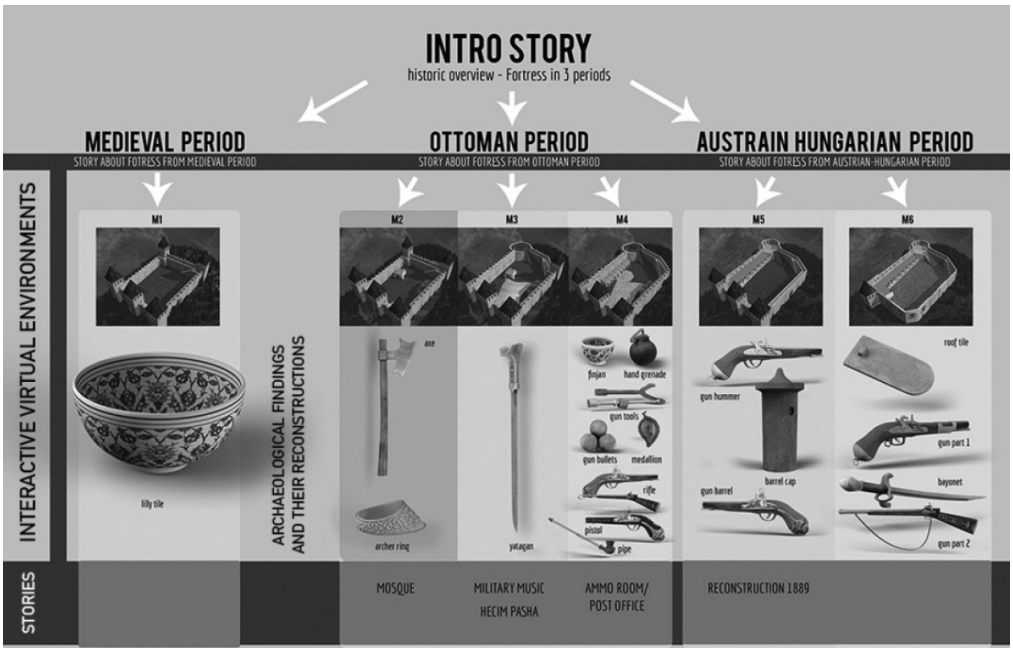


Fig. 2. White Bastion application's structure

Digital stories are combined with virtual reality environments where users are free to explore models of the fortress, examine archaeological findings' reconstructions and watch stories about particular details from Bastion's history.

Cognitive load

Digital storytelling is a form of multimedia storytelling where narrative is combined with pictures, sounds and video animations. Digital stories can be educational, historical, entertaining and have wide application in education, business world, public health and healthcare, social media and libraries.

Digital story represents the kind of hypermedia in a wider context. Hypermedia is expanded version of hypertext to which multimedia elements are added. Hypertext and hypermedia are the subjects of many intensive researches in educational sciences given

their significant educational potential. Unfortunately, the results of research of hypertext efficiency on learning are not consistent (Schurer, Opitz, Schubert, 2023). There is a general consensus that processing the content of hypertext and hypermedia is very cognitive demanding, and can cause disorientation hence the cognitive overload can lead to less efficient learning. The high level of cognitive effort and possibility of disorientation can significantly reduce the state of involvement of the user. The Cognitive Load Theory (CLT) is one of today's most famous theories of educational psychology introduced in (Sweller ,1988). It contains a universal set of learning principles that result in an efficient learning environment (Sweller, Ayres, and Kalyuga, 2011). CLT is applicable to all types of content, all media and all users. This is a relatively new paradigm in psychology, the possibility of designing content in a way that it maximizes people involvement regardless of individual differences. Furthermore, on this premise CLT developed set of guidelines for instructors to follow while designing educational content. These guidelines have been validated in number of experimental research done by CLT researchers. Following the same logic and train of thought CLT researchers have started to look for ways to apply CLT instruction guidelines in education software and multimedia. Following this train of thought we can conclude that, every multimedia environment should be designed in compliance with architecture and processes of a human mind, in order to achieve the state of involvement.

For software developers this is a practical and innovative approach in designing content that will be optimal for all users. The settings and the predictions of a theory are empirically verified in a number of experimental studies (Mayer, 2001; Brünken and Leutner, 2001; Plass and Salisbury, 2002).

CLT sets the scene for creating a more efficient hypermedia in general, and hence digital stories as well. In addition, clear and operationally defined variables, from the CLT settings, are important for testing the efficiency of a hypermedia environment, including digital stories. According to the Cognitive Load Theory, the human cognitive architecture is a register of working and long-term memory (Sweller, Ayres, Kalayuga, 2011). In working memory, information that we receive from the environment, as well as information that is already stored in long-term memory, is processed. The previously acquired knowledge is stored in the form of mental schemes in long-term memory. The scheme is a cognitive construct that organizes multiple elements of information into a unique element (Chi, Glaser and Rees, 1982) Learning is defined as a process of forming a scheme. The scheme that is being formed is being processed consciously and with a significant cognitive effort.

Cognitive load represents the actual amount of working memory's resources invested in cognitive activity. Or we can say that cognitive load refers to the total amount of mental effort being used in the working memory. It depends on many factors, including material complexity, prior knowledge and motivation.

According to original CLT, the content of a particular structure and presentation mode can lead to three types of cognitive load: intrinsic, extraneous and germane.

The intrinsic cognitive load is conditioned by the complexity of the information being learned or the problem being solved. The intrinsic load level is determined by the number

and interactivity of the elements (symbols, concepts, procedures, rules, and links) that are simultaneously processed in working memory (Sweller and Chandler, 1994).

The extraneous load is unnecessary (unproductive, unconstructive, bad) load due to the design and organization of material, format, and manner of information presentation. It requires additional mental effort due to unnecessary cognitive activities that do not contribute to the adoption or automation of the scheme (Van Merrienboer and Sweller, 2005).

Intrinsic and extraneous loads are primarily determined by the characteristics of the material being taught or the problem being solved and to a certain extent by the characteristics of the person. Together, these two loads determine the total cognitive load conditioned by the material that needs to be learned or the problem that needs to be solved, what is in line with a revised version of CLT presented by Sweller, van Merriënboer, and Paas (2019) with germane load considered as "germane processing."The load inflicted by the processes leading to the formation and automation of the scheme is the germane load. This load directly contributes to the process of learning and problem solving, as it includes work memory resources devoted to the processing of the learning material's interactive elements. Mayer (2005) offered Cognitive theory of multimedia learning that is in its later iterations defined as a Cognitive- affective theory of multimedia learning. In this theory concepts of CLT are explained in light of multimedia context. Digital storytelling takes place in the interaction between users and computers. In order for the digital story to meet the usability criteria, it is necessary to reduce unnecessary cognitive load, adjust intrinsic load and increase the germane load. Comprehensive summary of challengies in understanding cognitive load in digital and online learning (Skulmowski and Xu, 2022) concluding that the extraneous load in online learning can have different components, and that the challenges presented demonstrate that design of digital learning environment while inducing cognitive load is increasing learning performance.

The following parts of the paper are presentation examples that lead to an increase or decrease in cognitive load.

Cognitive Load on a Macro Level

The structure of the homepage and the contents of the introduction story have the function of the organizer. The use of different organizer forms is an effective way of organizing information presented in hypermedia, which results in a decrease in cognitive load, especially for beginners (Chalmers, 2003). The choice of graphical user interfaces representing each time period is appropriate because it is clear and intuitive and contributes to the activation of prior knowledge. However, the functional and aesthetic improvements are possible, thus making the homepage more interesting and dynamic.

The user can freely browse the presentation. For example, first, they can choose the introductory module and then the Ottoman period next. However, the logic of the presentation imposes a linear sequence of movements since the modules are chronologically sorted. At the macro level, the possibility of disorientation is minimal, which is expected with a relatively small number of modules.

COGNITIVE LOAD OF DIGITAL STORIES

When the digital story is linear, the user has the ability to control its presentation. The user has the ability to stop, return and move in advance. The ability to control the presentation is an important feature of reducing intrinsic loads in dynamic multimedia presentations.

Initial scenes in videos (such as the Ottoman period) are not consistent with the content of the spoken text. Namely, the narrator explains that in one period "there were no wars or fights, nor the need to make swords or to build the fortification walls", while the screen depicts scenes of destroyed parts of the fortress. The user is exposed to two different messages that are not congruent, but which still need to be processed and form a coherent mental model. The basic content is contained in a text spoken by the narrator. Therefore, video content can be considered redundant, and the principle of coherence is disrupted.

This kind of problem is common in the presentation. We can conclude that the cognitive load can be reduced by creating highly usable software, as well as adjusting the story content to the specific characteristics of the user. Furthermore, the principles of learning derived from the theory of cognitive load and the process model of the digital story provide guidelines for designing an efficient multimedia environment for the digital story. The digital story will be a more effective learning tool with using graphical content and spoken text rather than graphic content and written text (modality or multimedia principle).

The modality effect is mostly studied in the field of multimedia design. In multimedia, the modality effect is applied by presenting animation and narration rather than animation and text on the screen. The modality effect can be of particular importance when complex material needs to be presented in a short period of time. In this case, the presentation of animation and text can lead to a split attention effect, in which students have to divide their cognitive capacity between animation and text. The solution to this problem is to replace the text on the screen with narration, which relieves the visual channel and burdens the auditory one. In fact, the mentioned effect is a part of multimedia learning, in which the input information is presented in several forms (Mayer, 2005).

According to Kalyuga (2009) these are some of the CLT specific implications for designing situations involving multimedia:

- written text enriched with visual representations;
- presenting visualizations and appropriate textual explanations simultaneously rather than sequentially to avoid temporal division of attention;
- present connected sources of information close to each other on the screen (eg, insert text into graphics, avoid covering or separating information that must be mentally integrated for learning, design a space for guidance or feedback near the space for a friend);
- avoid irrelevant graphics, explanations, interesting but unimportant details, unimportant sounds and music, meaningless words and long text;
- use visual representations explained by the sound of the narration, not the text on the screen;
- use animated visualizations with short audio narratives rather than on-screen textual explanations;
- present static or animated visualizations with narrative only, instead of duplicating the narration with the text on the screen

RESEARCH QUESTION

Motivation for our research is to obtain reliable measure of success of multimedia digital heritage applications, especially measuring success in achieving features as edutainment and immersion. The quantitative approach in measurement of edutainment and immersion is important when assessing the level of development of the application or comparing different solutions. Developing standardized system for evaluation requires extensive data collection activities, especially when assessing multimedia cultural heritage applications. The challenge in standardization is to design a framework questionnaire adapted to specific content of a specific cultural heritage application. Inspired with the SUMI questionnaire (Kirakowski & Corbett, 1993) and possibility to build a significant database of evaluation results available for analyses we would like to develop similar instrument specific for the multimedia digital heritage applications. Important decision is how to start this process and to build a data collection for future research in this field. Our choice of White Bastion application is motivated by (1) familiarity with the application and also (2) with the results of several different evaluations of this application, including user surveys, Cognitive Load measurements and Heuristic Evaluation. We do not expect that measuring can be a solution in removing interaction flaws, not even to provide precise identification of the flaws, but this simple and efficient instrument can guide developers towards the most needed improvements in designing interaction of multimedia heritage applications. This is the reason that we do not aim to use benchmarking process as a ranking, but as being "the process of identifying and learning from good practices in other" as it is considered in the quality management field (Chalmers 2003).

MEASURING METHODOLOGY

We have decided for the self-selection of users, with emphasis on their reliability, and openness to convey negative opinions, and disclose the information on time they dedicated to interaction with the presentation. In order to ensure that the responses represent diverse cross-section of respondents and to establish validity of survey responses, we included questions for relevant demo-graphic data: age, education and computer skills (Lazar and Preece, 2001).

A. Questionnaire. First version of questionnaire was designed containing 26 items. The questionnaire was reviewed by graduate students involved in research in the field of human–computer interaction, checking the consistency and clarity of items and also the balance in evaluating main dimensions or attributes; usability, immersion and edutainment. The later influenced addition of two items to each scale: digital stories and virtual models. The questionnaire contains four sections: (1) introductory part with data for user profiling, (2) questions assessing "completeness of interaction", (3) main part for separate evaluation of digital stories and virtual models, each made up of 3 sub-scales addressing immersion, edutainment and usability satisfaction; containing total 30 Likert items, and (4) open questions where users can express their opinion about the presentation and the most favorable and the most problematic parts. Likert scale items were defined as straightforward

statements with positive logic, repetitions were avoided. The number of items in the sub-scales were not exactly the same, the importance of immersion is highlighted with more items (6) for evaluating White Bastion Digital Stories, as opposed to importance of usability for White Bastion Digital Models represented with 7 items. Complete list of items is presented in Section discussing results.

B. Participants. The evaluation involved 40 participants. Presentations of multimedia digital heritage is intended for a broad audience, and we aimed to balance different user types regarding their professional background: engineering (n=15), history (n=15) and art (n=8); and their computer proficiency: basic and intermediate (n=18), advanced (n= 11) and professional (n=11). With respect to age participants were categorized into following groups: younger than 20 (n=5), ages 20-30 (n = 26), ages 31-50 years (n = 5), and aged older than 50 years (n = 4). It is evident that the largest group was students.

C. Procedure. The users were invited to take a tour within the White Bastion presentation and after that answer the questions summarizing their perceived experience in using the application. Not being in a laboratory under strict observation, they were expected to watch the presentation in real life context, with possibility of interruptions, discontinuity in watching, etc. The complete interaction with the presentation lasts approximately 45 minutes. Total duration of digital stories is 30 minutes, and touring the White Bastion virtual model takes in average 10-15 minutes. The users needed to spend additional 10-15 minutes for answering web based post-interaction questionnaire.

RESULTS AND DISCUSSION

Results are analyzed separately for different modes of content delivery: digital stories and interactive digital virtual models.

Table 1 Stories

Attribute	Item	Mean	Std. dev.
Edutainment	Q2 - I have learned a lot from the stories	1,65	0,66
	Q3 - I became very interested in history of White Fortress	1,98	0,97
	Q4 - I wish to learn more about historical events in Sarajevo	1,65	0,74
	Q10 - I was surprised by the fact that White Fortress had very important role through different periods	1,73	0,91
	Q12 - I would like to see more stories about historical buildings	1,60	0,67
Immersion	Q1 - I have enjoyed watching all the videos	1,70	0,65
	Q5 - The music was very pleasant	1,75	0,95
	Q7 - The narrator voice was very pleasant	1,53	0,64
	Q8 - The story about Austro-Hungarian conquest of Sarajevo was interesting	1,95	0,88
	Q11 - The introduction story was very interesting	2,35	1,17
	Q14 - Time flied fast while listening and watching the stories	2,05	0,88

User Experience	Q6 - I liked the illustrations, drawings and photos of story events	1,60	0,71
	Q9 - I like the way that Sarajevo's soldier is presented in different periods of time	1,68	0,80
	Q13 - I would recommend these stories to my friends	1,65	0,70
	Q15 - Browsing the stories and choosing their order was easy for me	2,05	1,20

Table 2 Model

Attribute	**Item**	**Mean**	**Std. dev.**
Edutainment	Q5 - I have enjoyed exploring the White Fortress	2,00	0,93
	Q6 - I liked the 3D reconstructions of archaeological artifacts	1,98	0,76
	Q8 - The interior of White Fortress is very realistic	2,13	0,94
	Q15-The potential to follow development and change of White Fortress is very interesting	1,73	0,68
Immersion	Q2 - I could imagine the soldiers on White Fortress	2,03	0,86
	Q3 - I almost felt like I was inside the real White Fortress	2,48	1,08
	Q9 - Time flied fast while I was walking in White Fortress virtual environment	2,25	0,87
	Q10 - The colors of the model were very calming	2,10	0,76
User Experience	Q1 - I didn't wait for the 3D model to load completely	2,40	1,46
	Q4 - Moving in White Fortress virtual environment was easy	2,28	0,93
	Q7 - I could easily notice the objects with 3D reconstructions in virtual environment	2,35	1,09
	Q11 - I could easily navigate to other parts of the presentation	2,28	0,92
	Q12 - The movement through virtual environment was hard to control	3,45	1,06
	Q13 - I felt dizzy because the model was spinning while I was walking through it	3,23	1,32
	Q14 - I have noticed that clicking on the soldier activates the video story	2,70	1,09

Visualization provides insight in assessment of answers for each specific item in the main part of the questionnaire, and grouped according the sub-scales, as presented in Fig. 3 and Fig. 4.

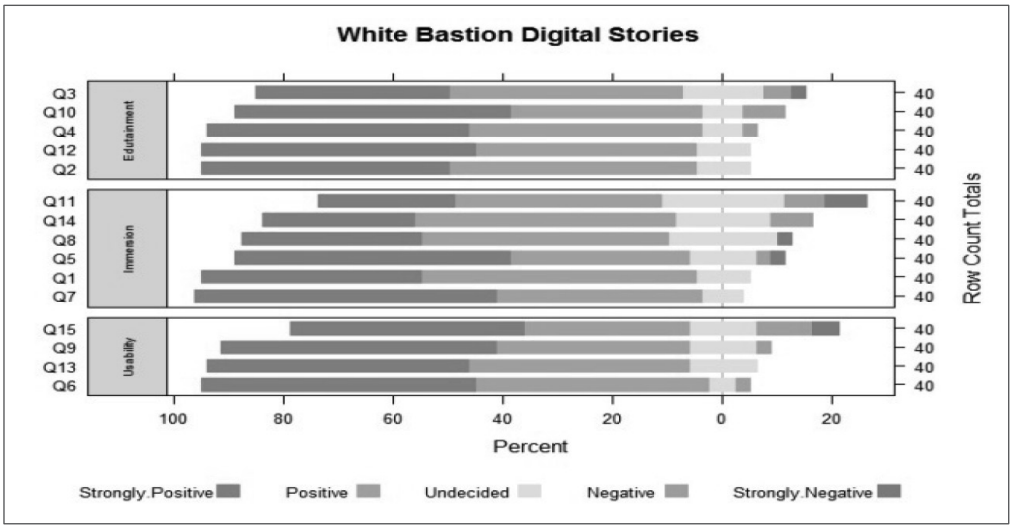


Fig. 3 Visualization of results for Digital Stories

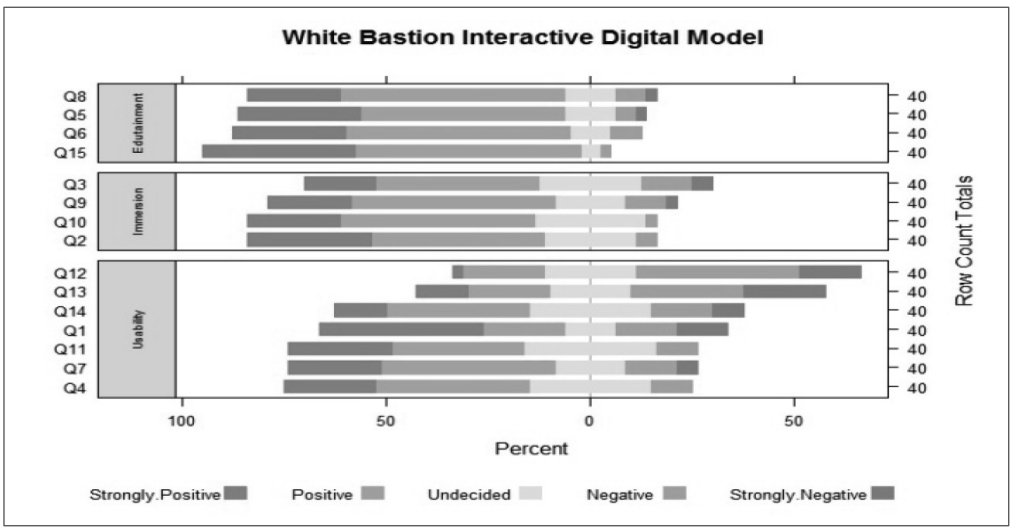


Fig. 4 Visualization of results for Interactive Digital Model

We have devised steps to create a single metric summarizing results for the White Bastion 4D model. First step is to calculate metrics to summarize scaling data for each of 6 sub-scales, to make them more interpretable and enable comparison of the main factors: immersion, edutainment, and usability. We have explored results obtained using several typical scores defined by Sauro and Lewis (2016) and although the absolute values were different, the patterns observed when identifying the highest and the lowest values, were the same. Results obtained for the scores "Percent Agree" and "Net Promoter Score (Customer Experience Index)" are presented in Table 3. Results indicated the lowest rating (22.1%)

for usability of the Bastion's virtual models: for their experience of navigating within the virtual models, or noticing 3D models of archeological objects. We were aware of these difficulties reported in prior evaluations. It is interesting to notice that these difficulties also caused lower rating in the statements related to immersion of the Bastion virtual models.

Table 3 Summary results

Feature	**Digital Stories**	**Bastion Models**
	Percent Agree	
Edutainment	86.5%	83.1%
Immersion	80.0%	67.5%
Usability	84.4%	49.3%
	Customer Experience Index	
Edutainment	83.0%	76.3%
Immersion	75.0%	58.1%
Usability	79.4%	22.1%

The reason for the highest rating (79.4%) for usability of digital stories is obvious, since that is the part of the application where users are merely passive viewers and listeners. The more important are the difference in ratings calculated for immersion for digital stories (75.0%) and for the Bastion models (58.1%). We will not evaluate the difference arithmetically, but we can make conclusions based on possibility to identify the better of the two. Explanation for the difference is linked to usability scores and it is obvious that flaws in usability for digital stories highly affect possibility of user immersion. Further steps in aggregation of metrics would need more detailed analysis and validation against data from additional case studies to decide on appropriate weights when combining different dimensions: Usability, Immersion and Edutainment. If we decided to use uniform weights for the three dimensions, following benchmarks were calculated:

- - White Bastion Digital stories: 0.79
- - White Bastion Virtual model: 0.52

Quality of the production and the performance of digital stories resulted in achieving the higher value of benchmark.

CONCLUSIONS AND FUTURE WORK

The achieved results are in accordance with our previous experience in evaluating the same application. Regarding edutainment, we can conclude that virtual models present an entertaining way to engage users in exploring historical artifacts and to motivate them to learn more, even when accompanied with the reported issues in navigation and visibility. The compliance of the evaluation results is important for assessing our quantitative approach and possibility to develop benchmarking instrument for multimedia cultural heritage.

In order to validate our approach, we plan to continue using it as a framework for future evaluations and to build substantial data repository enabling more comprehensive research in this field. Our next step is to advertise both 4D model and the user evaluation questionnaire more publicly in order to obtain larger sample size and to enable further statistical analysis of the results. In order to address edutainment and especially immersion, the items in the questionnaire for multimedia applications has to be specific and linked directly to the content and features of the application. This is preventing design of a generic questionnaire applicable for evaluating different multimedia applications. Possibility to compare results of evaluation across different applications demands that the questionnaire is designed following proposed structure and keeping the balanced number of questions for the three main dimensions: Immersion, Edutainment and Usability.

REFERENCES

Bolchini, D., & Garzotto, F. (2007, December). Quality of web usability evaluation methods: An empirical study on MiLE+. In *International Conference on Web Information Systems Engineering* (pp. 481-492). Springer, Berlin, Heidelberg.

Brown, E., & Cairns, P. (2004, April). A grounded investigation of game immersion. In *CHI'04 extended abstracts on Human factors in computing systems* (pp. 1297-1300).

Brünken, R., & Leutner, D. (2001). Aufmerksamkeitsverteilung oder Aufmerksamkeitsfokussierung? Empirische Ergebnisse zur "Split-Attention-Hypothese" beim Lernen mit Multimedia [Split of attention or focusing of attention? Empirical results on the split attention-hypothesis in multimedia learning]. Unterrichtswissenschaft, 29, 357–366.

Chalmers, P. A. (2003). The role of cognitive theory in human–computer interface. Computers in: Human Behavior, 19(5), 593–607.

Chi, M.T.H.; Glaser, R. and Rees, E. (1982) "Expertise in Problem Solving" in R.J. Sternberg (ed.) Advances in the Psychology of Human Intelligence, vol. 1. Hillsdale, NJ: Lawrence Erlbaum and Associates.

De Oliveira, R. P., de Oliveira, D. C. P., & Tavares, T. F. (2016). Measurement methods for phenomena associated with immersion, engagement, flow, and presence in digital games. In *Proceedings of SBGames* (pp. 127-135). Sao Paolo, Brazil.

Dillon, A., & Gabbard, R. (1998). Hypermedia as an educational technology: A review of the quantitative research literature on learner comprehension, control, and style. *Review of educational research*, *68*(3), 322-349.

IJsselsteijn, W., De Kort, Y., Poels, K., Jurgelionis, A., & Bellotti, F. (2007, June). Characterising and measuring user experiences in digital games. In *International conference on advances in computer entertainment technology* (Vol. 2, p. 27).

Jennett, C., Cox, A. L., Cairns, P., Dhoparee, S., Epps, A., Tijs, T., & Walton, A. (2008). Measuring and defining the experience of immersion in games. *International journal of human-computer studies*, *66*(9), 641-661.

Kalyuga, S. (2009). Managing cognitive load in adaptive ICT-based learning. *Systemics, Cybernetics and Informatics*, *7*(5), 16-21.

Karolcík, Š., Cipková, E., Hrušecký, R., & Veselský, M. (2015). The comprehensive evaluation of electronic learning tools and educational software (CEELTES). *Informatics in Education*, *14*(2), 243-264.

Kirakowski, J., & Corbett, M. (1993). Sumi: The software usability measurement inventory. *Br J Educ Technol*, *24*(3), 210-2.

Laboratory for Computer Graphics Sarajevo Graphics Group "4D virtual presentation of White Bastion fortress," Faculty of Electrical Engineering University of Sarajevo, Sarajevo, Bosnia and Herzegovina, accessed on June 15, 2017 http://h.etf.unsa.ba/bijelatabija

Lazar, J. (2001). Using Electronic Surveys to Evaluate. *Evaluating networked information services: Techniques, policy, and issues*, *1*, 137.

Leppink, J., Paas, F., Van der Vleuten, C. P., Van Gog, T., & Van Merriënboer, J. J. (2013). Development of an instrument for measuring different types of cognitive load. *Behavior research methods*, *45*(4), 1058-1072.

Mayer, R.E., (2005). Cognitive theory of multimedia learning. *The Cambridge handbook of multimedia learning*, *41*, pp.31-48.

Mayer, R. E. (2001). Multimedia learning. New York: Cambridge University Press.

Plass, J. L., & Salisbury, M. W. (2002). A living systems design model for web-based knowledge management systems. Educational Technology Research and Development, 50. 35 – 57.

Poels, K., de Kort, Y.A.W., & IJsselsteijn, W.A., (2007). "D3.3: Game Experience Questionnaire: development of a self-report measure to assess the psychological impact of digital games," Eindhoven: Technische Universiteit, Netherlands, https://research.tue.nl/en/publications/d33-game-experience-questionnaire-development-of-a-self-report-me

Pope, J. (2013). The way ahead: The teaching of hyper-narrative at Bournemouth University. *New Writing*, *10*(2), 206-218.

Prinz, A., Kollmer, J., Flick, L., Renkl, A., Eitel, A. (2022) Refuting student teachers' misconceptions about multimedia learning. Instr Sci 50, 89–110 https://doi.org/10.1007/s11251-021-09568-z

Qin, H., Rau, P. L. P., & Salvendy, G. (2007, September). Player immersion in the computer game narrative. In *International Conference on Entertainment Computing* (pp. 458-461). Springer, Berlin, Heidelberg.

Sauro, J., & Kindlund, E. (2005, April). A method to standardize usability metrics into a single score. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 401-409).

Schrepp, M., Thomaschewski, J., & Hinderks, A. (2017). Construction of a benchmark for the user experience questionnaire (UEQ).

Schurer, T., Opitz, B., & Schubert, T. (2023). Mind wandering during hypertext reading: The impact of hyperlink structure on reading comprehension and attention. Acta Psychologica, 233, 103836.

Skulmowski, A., Xu, K.M. (2022). Understanding Cognitive Load in Digital and Online Learning: a New Perspective on Extraneous Cognitive Load. Educ Psychol Rev 34, 171–196 https://doi.org/10.1007/s10648-021-09624-7

Shapiro, A., & Niederhauser, D. (2004). Learning from hypertext: Research issues and findings. In D. H. Jonassen (Ed.), Handbook of research on educational communications and technology (pp. 605–620). Mahwah, NJ: Erlbaum.

Sweller, J. (1988). Cognitive Load during Problem Solving: Effects on Learning. *Cognitive Science*, 12, 257-285.

Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and instruction*, *4*(4), 295-312.

Sweller, J., & Chandler, P. (1994), "Why some material is difficult to learn", Cognition and Instruction, 1994, 12(3), 185-233, NJ: Lawrence Erlbaum and Associates.

Sweller, J., Ayres, P., & Kalyuga, S. (2011). Cognitive load theory. New York: Springer.

Sauro, J., & Lewis, J. R. (2016). *Quantifying the user experience: Practical statistics for user research*. Morgan Kaufmann.

Sweller, J., van Merriënboer, J. J., & Paas, F. (2019). Cognitive architecture and instructional design: 20 years later. Educational Psychology Review, 31(2), 261–292.

Van Merriënboer, J. J. G., & Sweller, J. (2005). Cognitive load theory and complex learning: Recent developments and future directions. Educational Psychology Review, 17(2), 147–177.

Weibel, D., & Wissmath, B. (2011). Immersion in computer games: The role of spatial presence and flow. *International Journal of Computer Games Technology*, *2011*.

Wiberg, C., & Jegers, K. (2003). Satisfaction and learnability in edutainment: a usability study of the knowledge game 'Laser Challenge'at the Nobel e-museum. In *HCI International*.

INTEGRATING DIGITAL COMPETENCIES INTO HIGHER EDUCATION CURRICULA

A Case Study from LOGOS University College within the HOMO DIGITALIS Project

Juna **MUÇA**[1*], Anxhela **LASKA**[1],
Elpiniqi **MERKURI**[2], Edvaldo **BEGOTARAJ**[2]

[1]LOGOS University College;
[2]Department of Human Neuroscience, Sapienza University of Rome
Corresponding Author*: juna.muca@kulogos.edu.al

Abstract

This paper examines a specific component of the HOMO DIGITALIS project, namely the revision of selected syllabi within the humanities and social sciences at LOGOS University College (CU LOGOS). The aim was to integrate digital competencies into traditionally non-digital courses in order to enhance student learning experiences and professional preparedness. A survey with 43 students enrolled in revised courses collected both quantitative data (Likert-scale ratings on perceived usefulness, motivation, and tool adoption) and qualitative reflections through open-ended questions. Findings indicate that students expressed enthusiasm for digital platforms such as Microsoft Teams, Canva, and AI-based applications including ChatGPT, particularly in translation and research-related tasks. They reported increased collaboration and motivation, though varying levels of digital literacy and limited access to premium software created challenges. Faculty also encountered difficulties in shifting students away from familiar communication practices toward institutional platforms. These results suggest that integrating digital competencies requires not only technological provision but also pedagogical adaptation, structured training, and equitable access to resources. The study is limited to CU LOGOS and does not include partner institutions of the HOMO DIGITALIS project; therefore, conclusions should be interpreted in this context. Overall, the findings highlight both the transformative potential and the practical challenges of embedding digital competencies into higher education curricula.

Keywords: Higher education, digital competencies, curriculum reform, interdisciplinarity, digital literacy, HOMO DIGITALIS Project, AI in education

ABOUT THE AUTHORS

JUNA MUÇA

M.Sc Juna Muça is a lecturer and coordinator of the Social Work program at the Faculty of Humanities, Social Sciences and Education at University College "Logos", as well as a part-time lecturer at the Department of Labor and Social Policy, Faculty of Social Sciences at the University of Tirana since 2014. She graduated as Social Policies Administrator at the Department of Labor and Social Policy, Faculty of Social Sciences, University of Tirana (UT) where she also completed her graduate studies in the program of Social Services in Penal Justice. She is currently a doctoral candidate in the field of Social Work and Policy at the Faculty of Social Sciences, University of Tirana. Her areas of expertise and interest lay mainly in research in social sciences, social policies in penal justice, and conflict management. Her work experiences in these fields include teaching at Bachelor and Master's levels and conducting scientific research focused mainly on issues related to criminal justice, as well as on development issues related to conflict management in various social fields. Her contributions in these fields have been enriched through quantitative and qualitative research.

ANXHELA LASKA

Anxhela Laska holds a Bachelor's degree in Greek Language, Literature and Civilization from the Faculty of Foreign Languages, University of Tirana (2018) and a Master's degree in Greek Language Teaching for Upper Secondary Education, Department of Greek Language, Faculty of Foreign Languages, University of Tirana (2022). She has completed various trainings and has several certificates on modern methods and effective learning. In the field of teaching and translation, she has collaborated with the Greek-Albanian College 'Arsakeio of Tirana' and the Greek Cultural Foundation. In addition to teaching, she has also worked as a translator, interpreter and editor in Albanian and Greek. Her teaching areas include lexicology, morphology, didactics, academic writing, translation. She is also experienced in preparing students for Greek language certification and students for the naturalization exam. M.Sc. Anxhela Laska is currently an Assoc./Lecturer of Greek Language at the Department of Greek Language and Civilization, Faculty of Humanities and Language Communication, Logos University College and an external collaborator at the Greek Language Center.

ELPINIQI MERKURI

Elpiniqi Mërkuri (Vlora, Albania) serves as Chair of the Vlora Municipal Council and is currently a doctoral candidate at La Sapienza University of Rome, Faculty of Clinical Neuroscience and Psychiatry. She completed her undergraduate and graduate studies in Clinical Psychology at the University of Tirana, where she was awarded the Certificate of Excellence upon graduation from the Master of Science program. Her academic trajectory

is complemented by professional training in mental health, forensic psychology, child development, and sustainable development (Beijing, China). She has presented scholarly work at national and international conferences, addressing topics such as emotions and artificial intelligence, socio-emotional well-being, and body image in adolescence. Her doctoral research focuses on alexithymia, body image, self-esteem, and eating disorders among adolescents. Professionally, Mërkuri has held positions within the Public Health Directorate of Vlora, where she contributed to initiatives on gender-based violence, psychosocial support during the COVID-19 pandemic, and community health promotion. She has also acquired experience in the pharmaceutical sector with an international company.

EDVALDO BEGOTARAJ

Edvaldo Begotaraj, PhD in Dynamic and Clinical Psychology completed his professional and psychological education at Sapienza University of Rome, Italy, Department of Dynamic and Clinical Psychology in 2020. Graduated in Clinical and Community Psychology at the same University in 2007. After academic positions in Albania and Italy, he was appointed Head of Department of Pedagogy-Psychology at KU LOGOS, Albania. He is member of several European psychological associations. Dr Begotaraj has been principal and co-investigator in numerous national and mainly international studies in traumatic psychological intervention, clinical psychology, mental health of students and has published more than 30 scientific reports, a considerable part of them in peer review article his research includes projects on public health, mental health, covid-related psychological symptoms on different clinical and non-clinical populations. Dr. Begotaraj is credited as a reviewer for many indexed journals of high impact factor. Some of his works has been awarded with Best Prize in international conferences in Italy. Keyword characterizing the expertise: motivation, anxiety, depression, mental health, narrative exposure treatment.

INTRODUCTION

The rapid pace of digital transformation across industries has created a pressing need for universities to adapt curricula to equip students with relevant competencies. Scholars emphasize that higher education must align itself with technological and societal shifts in order to remain relevant and prepare graduates for the demands of the 21st-century workforce (Redecker, 2017; European Commission, 2020). Traditional academic structures, however, often lag behind technological innovation, leading to a skills mismatch between what students learn during their studies and what employers expect in the labor market (van Laar *et al.*, 2019). This gap not only limits graduates' employability but also challenges universities to rethink teaching and learning strategies.

In this context, curriculum reform has emerged as a central priority. Universities are expected to integrate digital literacy, interdisciplinarity, and innovative pedagogical methods that enhance students' ability to think critically and solve complex problems. Digital education is not simply about adding technological tools to existing courses, but about reshaping the very nature of learning environments (Ng, 2012). Such reforms require flexibility, interactivity, and inclusivity, enabling students to apply knowledge across contexts and disciplines while developing transferable skills such as collaboration, adaptability, and creativity (Nowotny, 2003).

At the same time, policymakers increasingly recognize the strategic role of higher education in supporting Europe's digital transition. Initiatives such as the *Digital Education Action Plan* (European Commission, 2020) highlight the importance of embedding digital skills across all levels of education, not only as technical competencies but as essential capacities for civic participation, lifelong learning, and innovation. Research also shows that students' ability to use digital tools effectively is closely linked to their confidence, motivation, and capacity for critical thinking (Calvani, Fini, & Ranieri, 2010). These findings suggest that higher education reforms must take a holistic approach, addressing both the technological and the pedagogical dimensions of digitalization. The *Homo Digitalis* project addresses these challenges by systematically revising and updating course syllabi across diverse academic programs. Its central aim is to embed digital competencies in the curriculum, thereby fostering technical proficiency while also promoting critical thinking and interdisciplinary collaboration. By rethinking how courses are designed and delivered, the project seeks to bridge the gap between academic training and real-world requirements, ensuring that graduates are prepared not only for immediate labor market demands but also for lifelong learning in an ever-changing digital environment. The study explores both the opportunities and challenges associated with implementing digital education reforms, with particular attention to student feedback and participation. The analysis offers insights into how digital tools can transform learning outcomes while also highlighting persistent barriers, such as inequalities in access to technology and differences in prior digital literacy.

The following research questions guide this paper:

- How does the integration of digital competencies reshape student learning outcomes?
- What are the main challenges faced by students and faculty in the transition to digital education?
- How does student feedback reflect the effectiveness of digital integration?

LITERATURE REVIEW

Higher education reforms increasingly emphasize digital skills as essential for employability and lifelong learning (European Commission, 2020; Redecker, 2017; Vuorikari, Punie, Carretero, & Van den Brande, 2016). As societies become increasingly digitized, the acquisition of such skills is no longer optional but a prerequisite for effective participation in academic, professional, and civic life. Studies highlight that digital competencies extend beyond technical knowledge to include adaptability, collaboration, creativity, and innovation (van Laar, van Deursen, van Dijk, & de Haan, 2019; Ilomäki, Paavola, Lakkala, & Kantosalo, 2016). In this sense, digital skills are multidimensional, involving not only technical mastery but also critical reflection, ethical use, and problem-solving.

The notion of digital competence has expanded significantly in recent decades. While early conceptualizations equated digital literacy primarily with the ability to use information and communication technologies, contemporary frameworks emphasize a broader set of transferable skills (Ferrari, 2013). Van Laar *et al.* (2019) argue that 21st-century digital skills should be seen as a sequential model, starting from basic technical abilities and advancing toward higher-order competencies such as creativity, critical thinking, and problem-solving. Similarly, Ng (2012) underlines that digital literacy includes not only operational skills but also cognitive and socio-emotional dimensions that allow learners to evaluate, communicate, and collaborate effectively in digital environments. More recent studies demonstrate that integrating digital tools into course-based research projects significantly enhances students' capacity to apply these skills in authentic academic contexts (Chan & Sung, 2025). These perspectives confirm that digital competence is best understood as an evolving, layered concept rather than a fixed technical skill set.

Beyond core digital skills, interdisciplinarity is critical for fostering innovation in higher education. Nowotny (2003) highlights the importance of transdisciplinarity as a way to transcend disciplinary boundaries and address complex, real-world problems. This approach is particularly valuable in a digitalized society, where technological advances often demand knowledge integration across fields. For example, combining social sciences with data analytics, or education with artificial intelligence, enables students to develop both technical expertise and broader analytical capacities (Tondeur, Roblin, van Braak, Voogt, & Prestridge, 2017). Such approaches prepare learners not only for specialized tasks but also for adapting to rapidly changing professional contexts. Despite the clear value of digital modernization, significant obstacles persist. One of the main barriers concerns unequal access to technology. Students from lower socio-economic backgrounds often lack reliable internet connections, updated hardware, or access to premium software (European Commission, 2020; Aesaert & van Braak, 2015).

Another critical challenge lies in faculty preparedness. Lloyd (2012) observes that many educators perceive insufficient institutional support, lack of training opportunities, and heavy workloads as barriers to adopting digital pedagogies. Similarly, Martin, Budhrani, and Wang (2019) report that while faculty recognize the importance of online teaching skills, they often feel underprepared to deliver high-quality instruction in digital contexts.

Students themselves may also resist new digital approaches. Research shows that many learners prefer traditional face-to-face methods due to familiarity, perceived reliability, or cultural expectations (Ng, 2012). Resistance can also stem from limited prior digital literacy, making it difficult for students to adapt to advanced platforms and tools (Ilomäki *et al.*, 2016). Given these challenges, scholars call for comprehensive strategies that combine curriculum reform, faculty development, and student-centered approaches. Redecker (2017) argues that frameworks such as DigCompEdu provide essential guidance for educators by defining progressive levels of digital competence and encouraging reflective pedagogical practice. Embedding such frameworks into institutional strategies ensures coherence and sustainability (Vuorikari *et al.,* 2016). Recent empirical work also confirms the importance of validated instruments to assess digital competencies in higher education, which can guide more evidence-based reforms (Mejías-Acosta, Cabero-Almenara, Vázquez-Cano, Barroso-Osuna, & Estrada-Vidal, 2024).

The COVID-19 pandemic further underscored the urgency of digital education reform. The sudden shift to online teaching revealed not only the potential of digital platforms to sustain education under crisis conditions but also the vulnerabilities created by inequalities in access and readiness (European Commission, 2020). Moreover, the literature emphasizes that digital education reform should not focus solely on technical aspects but also address pedagogical innovation. As Nowotny (2003) notes, genuine transformation requires integrating multiple perspectives and fostering environments where students can co-create knowledge. By embedding digital competencies within interdisciplinary frameworks, institutions can empower students to engage critically and creatively with technology. In summary, the literature reveals a growing consensus that digital competencies represent fundamental 21st-century skills. While frameworks such as DigCompEdu and policy initiatives like the Digital Education Action Plan provide strategic direction (European Commission, 2020; Redecker, 2017; Ferrari, 2013), successful implementation depends on overcoming barriers related to access, faculty preparedness, and student adaptation. The evidence suggests that a holistic approach is necessary for higher education institutions to fully harness the benefits of digital transformation.

METHODOLOGY

This study is based on a descriptive survey design aimed at documenting the outcomes of curriculum revisions carried out in the framework of the Homo Digitalis project at LOGOS University College. The revised courses introduced digital competencies and AI-based tools into programs traditionally grounded in the humanities and social sciences, such as Social Work and Teacher Training.

Sample-and-Demographics

Participants were 43 students enrolled in revised courses during the 2023–2024 academic year. Approximately 70% were female, reflecting the gender distribution of the Social Work and Pre-School Teacher Training programs. Most undergraduate participants were between 20 and 22 years old, while Master's students in Translation were typically older (25–30)

and often engaged in part-time employment. This diversity allowed the study to capture perspectives from both early-career students and those already active in the labor market.

Instrument-and-Data-Collection

Data were collected during the spring semester of the 2024–2025 academic year. A structured online survey was designed using Google Forms and distributed via institutional email accounts to all students enrolled in the revised syllabi. The survey link remained open for a two-week period, during which students received two reminder emails to encourage participation. Out of approximately 55 students invited, 43 completed the survey, yielding a response rate of about 78%. The survey instrument consisted of two complementary components. The first included closed-ended questions structured on 5-point Likert scales, which measured students' perceptions of the usefulness of digital tools, their motivation to engage with coursework, and the frequency with which they adopted platforms such as Microsoft Teams, Canva, and ChatGPT. In addition to the structured survey used for quantitative data collection, a qualitative component was also included. The questions were specifically designed to capture students' reflections on their experiences with the revised courses and the integration of digital tools. For example, students were invited to respond to prompts such as: "Which digital tools supported your learning most effectively?" and "What challenges did you encounter when adapting to new digital methods?". The responses were collected simultaneously with the survey and analyzed separately from the quantitative items. A thematic coding procedure was applied to identify recurring patterns across answers. Answers included categories such as enthusiasm for AI-based translation tools, difficulties due to heterogeneous levels of digital literacy, and the perceived need for more practical laboratory sessions.

All responses were collected anonymously to reduce social desirability bias. Quantitative data were exported into Excel and analyzed through descriptive statistics (frequencies, means, standard deviations). Qualitative data were coded thematically by two members of the research team, following an inductive approach to identify recurring patterns such as increased autonomy, digital literacy gaps, and new forms of collaboration.

Data-Analysis

Quantitative data were processed using descriptive statistics (frequencies, means, standard deviations). Qualitative responses underwent thematic coding, which yielded categories such as: *Increased autonomy and motivation*, particularly in Translation and Social Work students. *Digital literacy gaps*, especially in Teacher Training students unfamiliar with databases or premium platforms. *New forms of collaboration*, with students noting a shift from private, closed-group communication toward institutional platforms.

Limitations

While the methodology provided valuable insights, certain limitations must be acknowledged. First, the study was intentionally limited to the humanities and social sciences programs at LOGOS University College, as this was the specific scope of the Homo Digitalis project.

Therefore, the findings do not aim to represent other disciplines within higher education or the wider consortium of project partners. Second, the relatively small number of revised courses and the modest sample of 43 students restrict the generalizability of the results. Third, the study did not include a control group of students enrolled in traditional, non-digital courses. As a result, the notion of "reshaping learning outcomes" refers exclusively to self-reported changes in motivation, collaboration, and digital practices among participating students, rather than to measurable differences established through comparative analysis. Finally, the evaluation captures only the early implementation phase, which means that long-term effects on academic performance and professional readiness remain to be investigated in future research.

RESULTS

Students described specific and concrete changes in their study practices. Social Work students reported moving from informal WhatsApp communication to structured use of Microsoft Teams, which increased accountability and collaboration in group projects. Teacher Training students, many of whom had limited prior digital exposure, emphasized that Canva and Padlet supported the creation of interactive teaching materials, which some of them later applied in practical teaching contexts. Translation students highlighted the role of AI tools such as ChatGPT in terminology searches and draft translations, reporting both greater efficiency and higher confidence in their professional preparation.

Updated Courses

The *Homo Digitalis* project revised nine courses across different academic programs, including *Digital Education, History of Albania, Visual Arts & Didactics, Research Method, Literature and ICT, Translation of Specific Texts & Terminological Documentation, Greek Art & ICT,* and *Computer Usage*. These are presented in Tab. 1, which outlines the course names, ECTS credits, programs, and semesters of delivery. The inclusion of courses from both undergraduate and postgraduate levels demonstrates the project's comprehensive scope and ensures that digital competencies were embedded across multiple stages of academic training.

Table 1 Courses who have been selected for revision

Course	ECTS	Program	Semester
Digital Education	6	Bachelor in Teacher Training for Pre-School Education	Semester V
History of Albania	4.5	Bachelor in Teacher Training for Pre-School Education	Semester III
Visual Arts & Didactics	4.5	Bachelor in Teacher Training for Pre-School Education	Semester IV
Translation of Specific Texts & Terminological Documentation II	6	M.Sc. in Professional Translation	Year I, Semester II
Literature and ICT	3	Bachelor in Greek Language and Literature	Year III, Semester I
Greek Art & ICT	4.5	Bachelor in Greek Language and Literature	Year II, Semester I

Course	ECTS	Program	Semester
Research Method	7	Bachelor in Social Work	Year II, Semester I
Computer Usage	3	Bachelor in Social Work	Year II, Semester I

Tools and Platforms

By combining professional-grade software with open platforms, the project ensured both employability relevance and accessibility for students. This variety of tools also raised the central research question of how the integration of digital competencies reshapes student learning outcomes, as different platforms enabled new forms of collaboration, creativity, and critical engagement. The revised syllabi employed a broad range of digital resources. Tab. 2 summarizes the main categories, including hardware (computers, smartboards), collaboration tools (Microsoft Teams, Slido), creative software (Adobe Photoshop, Adobe Premiere), AI and automation tools (ChatGPT, Gemini, Synthesia, Mentimeter, Research Rabbit, Doodle), and 3D/interactive resources such as reconstruction models and digital libraries. The survey data further highlighted frequently used platforms such as *Padlet* and *Canva*, especially for collaborative and visual tasks. By combining professional-grade software with open platforms, the project ensured both employability relevance and accessibility for students.

Table 2 Tools & Equipment

Type	Tools & Equipment
Hardware	Computers, Smartboards
Collaboration Tools	Microsoft Teams, Slido
Online Platforms & Databases	Padlet, Canva, Greek digital resources
AI & Automation Tools	ChatGPT, Gemini, Synthesia, Mentimeter, Research Rabbit, Doodle
3D & Interactive Media	3D reconstruction, interactive documentaries, digital libraries
Creative Software	Adobe Photoshop, Adobe Premiere
Data Analysis & Research	Online platforms, data analysis programs, research databases

While the diversity of tools enriched the teaching and learning process, their integration also raised several challenges, both technical and pedagogical, which are discussed in the following section

Challenges

Finally, in the case of literature courses, the use of digital media reshaped how students perceived the discipline, requiring additional pedagogical adjustments. These findings directly address the second research question, namely what main challenges students and faculty face in the transition to digital education, since both technical limitations and pedagogical shifts became visible in practice. Despite the variety of tools available, several challenges were reported during implementation. Faculty noted difficulties in encouraging students

to abandon private, familiar methods of collaboration in favor of institutional platforms. Another recurring theme was discrepancies in students' prior knowledge of basic computer usage, which created uneven levels of digital literacy within classrooms. In addition, access to specialized software was hindered by financial constraints, particularly in courses requiring data analysis programs. Finally, in the case of literature courses, the use of digital media reshaped how students perceived the discipline, requiring additional pedagogical adjustments. These findings speak directly to the research question on the main challenges faced by students and faculty in the transition to digital education, showing that the shift remains uneven and often resource-dependent rather than a seamless pathway toward "digital education."

Table 3 Challenges in implementation

Challenge	Description
Student Adoption	Encouraging students to use digital tools instead of private methods for collaboration
Literature & Digital Media	Adapting literature studies to digital methodologies, changing students' perceptions.
Prior Knowledge	Discrepancies in students' prior knowledge of basic computer usage.
Digital Literacy	Limited familiarity with digital tools and research platforms.
Resource Availability	Lack of access to certain necessary programs due to cost constraints.

Student Feedback

Student perspectives, collected through surveys, are summarized in Tab. 4. Learners consistently expressed enthusiasm for the modernized approach, particularly the use of AI in translation and terminology documentation. These suggestions highlight that while modernization was well received, structured support and gradual implementation remain essential. Student perspectives thus provide direct evidence to the third research question both enthusiasm for innovation and clear calls for further institutional support. Many respondents described exposure to AI instruments as rewarding for professional development and highly relevant to their future practice. However, the feedback also emphasized areas for improvement, such as the need for more laboratory sessions, ensuring that all students acquire foundational digital education before engaging with advanced tools, and securing greater financial support for access to paid platforms. This feedback provides an answer to the research question on how student perceptions reflect the effectiveness of digital integration: while students valued the innovations, their comments suggest that effectiveness depends strongly on structured support, training, and equitable access to resources.

Table 4 Student feedback & participation

Feedback	Comment
Excited about AI in translation	Students were excited to discover how generative AI supports translation and terminology documentation.
Modernized approach is appreciating	Students liked the new, modernized methodology
AI tools for professional practice	Exposure to AI instruments was rewarding for professional development.
Course not yet implemented	Some courses have not yet been delivered, so feedback is not available.

Participation Trends

Participation data are presented in Tab. 5, which distinguishes between implemented courses, upcoming courses, and those not yet delivered. A total of 43 students participated in implemented courses, 11 were enrolled in upcoming courses, and 26 were expected to join once additional courses were launched. The numbers demonstrated a steady trajectory of engagement with the revised curricula. Importantly, qualitative feedback suggests that students who were initially hesitant to adopt digital tools reported increased confidence over time, particularly after completing group projects through Microsoft Teams. In this sense, the integration of digital competencies offers at least a partial response to the research question on how student learning outcomes are being reshaped: students not only gained access to professional-grade digital tools but also began to develop confidence, collaboration skills, and new ways of conceptualizing disciplinary knowledge.

Table 5 Course participation

Course Participation	**Number of Students**
Implemented courses	43 students participated
Upcoming courses	11 students expected to participate
Not yet implemented	26 students planned for enrolment

DISCUSSION

The results of this study confirm that embedding digital competencies into higher education not only enriches student learning experiences but also enhances future employability. The revised syllabi within the *Homo Digitalis* project fostered a culture of innovation, where students actively engaged with AI-based translation platforms, collaborative tools, and digital creative software. Student enthusiasm for tools such as ChatGPT, Synthesia, and Canva illustrates the transformative potential of digital education. This enthusiasm reflects broader trends observed in higher education, where the integration of artificial intelligence and digital platforms is reshaping traditional teaching and learning processes (European Commission, 2020). The integration of digital competencies into revised syllabi at CU LOGOS remodelled student learning outcomes in multiple, course-specific ways. In the Social Work program, the adoption of Microsoft Teams shifted collaboration practices away from informal WhatsApp groups toward structured, institutionally supported platforms. Students reported that this change enhanced accountability, facilitated real-time sharing of resources, and improved the overall quality of group projects. In the Teacher Training program, as we mentioned previously, students with initially limited digital literacy gained hands-on experience with tools such as Canva and Padlet, which enabled them to design interactive teaching materials. Several students noted that they later applied these resources during practicum sessions, thereby translating digital competence into pedagogical innovation. In the Translation program, the use of AI applications such as ChatGPT was particularly impactful. Students employed AI for terminology searches, draft translations, and comparative analysis, reporting improved efficiency, higher confidence, and greater

professional readiness. However, the process also revealed transitional challenges. Some students struggled with uneven levels of prior digital literacy, while others expressed difficulty in abandoning familiar analog or private methods of learning.

Faculty faced the parallel challenge of adapting pedagogical approaches to align with digital practices, often requiring additional time and training. For this reason, the term "transition" is appropriate because students and faculty were not yet in a fully digital education environment but were navigating the in-between stage, where new tools coexisted with traditional habits. The transition toward digital education at CU LOGOS revealed a set of persistent challenges that affected both students and faculty, underscoring the uneven nature of this shift. Survey results indicated that approximately 40% of students reported limited prior knowledge of digital platforms beyond basic tools such as Word and PowerPoint. The gap was particularly evident among students in Teacher Training programs, where several respondents admitted to difficulties in navigating databases or in using collaborative software for the first time. From the faculty perspective, two main challenges were identified. Primarily, instructors faced additional workload and training needs, since many had limited prior experience in embedding digital tools within humanities curricula. Informal interviews revealed that several lecturers required extra time to redesign assignments, prepare tutorials, or troubleshoot technical issues. Subsequent, some faculty struggled with student engagement in literature-based courses, where integrating digital media altered traditional disciplinary approaches. Student feedback provided nuanced insights into both the strengths and limitations of digital integration at CU LOGOS. Quantitative survey results showed that over 70% of respondents rated the inclusion of digital tools as "useful" or "very useful" for their learning, while 65% reported increased motivation to engage with coursework compared to previous semesters. Especially Translation students, emphasized the relevance of AI tools such as ChatGPT for terminology searches and preliminary drafts of translations. One student explicitly commented that "using ChatGPT saved time in preparing draft texts and helped me focus on refining accuracy rather than starting from scratch." Approximately 60% of students of Social Work program, indicated that Teams enhanced group accountability over WhatsApp, with assignments and discussions becoming more transparent and better organized. However, feedback also revealed that about 20% admitted they continued to rely on private messaging for sensitive discussions. Among Teacher Training students, Canva and Padlet were appreciated for creating engaging, interactive teaching materials, but several respondents requested more laboratory sessions to build confidence in using these tools effectively. One open-ended response noted: "We enjoyed making digital posters, but we need guided practice sessions to learn how to use these tools independently.". Furthermore, about one-third expressed concern over access to premium software, with some stating that they were unable to complete certain assignments at the same level as peers who had subscriptions to Adobe Creative Suite. Student feedback reflects that digital integration was seen as highly valuable and motivating, particularly when connected to professional skills, but its effectiveness depended on consistent institutional support, equitable access to resources, and the provision of practical training opportunities. Several students faced initial adaptation difficulties due

to unequal digital literacy levels, confirming Ng's (2012) concern that not all "digital natives" inherently possess advanced digital competencies. Moreover, financial barriers to accessing premium software, such as Adobe Creative Suite, hindered full participation, highlighting the socioeconomic dimension of digital education. Without adequate institutional support, such gaps may reinforce existing inequalities rather than reduce them.

When compared with existing literature, the results align with calls for targeted faculty development. Redecker (2017) emphasizes that educators themselves must master digital pedagogies in order to guide students effectively. Similarly, Martin, Budhrani, and Wang (2019) point out that faculty members often feel underprepared to teach online or integrate digital resources meaningfully, which suggests that training programs are indispensable for sustainable reform. Faculty in this study reported challenges in encouraging students to transition away from familiar methods, reflecting Lloyd's (2012) observations that resistance remains one of the most significant barriers to digital adoption.

Another important implication of the findings is the need for institutional partnerships with technology providers. Collaboration with software companies could reduce the financial burden on students by offering subsidized or institutional licenses, thereby promoting inclusivity. Similar recommendations have been made in broader European policy frameworks, where strengthening the digital capacity of higher education is seen as a collective responsibility rather than an individual one (European Commission, 2020).

Finally, the transition to digitalized curricula requires more than technical adjustments; it demands a cultural shift in how both educators and students perceive learning. Nowotny (2003) highlights that innovation in higher education is strongest when it embraces transdisciplinarity, encouraging collaboration across fields and perspectives. In this study, the inclusion of courses from diverse programs, ranging from Social Work to Greek Literature, illustrates that digital competencies are not limited to technology-focused disciplines but are increasingly foundational across all areas of study.

Overall, the discussion demonstrates that digital education holds significant promise for transforming higher education in Albania and beyond. The enthusiasm of students provides a strong foundation, but addressing literacy gaps, faculty preparedness, and financial constraints will determine the sustainability of this transformation. By aligning with international frameworks and fostering local innovations, higher education institutions can create inclusive, forward-looking curricula that prepare students for the demands of the twenty-first century.

CONCLUSION AND RECOMMENDATIONS

The *Homo Digitalis* project demonstrates that systematic curriculum revisions can effectively bridge the gap between academic learning and the demands of the digital workforce. By embedding digital competencies into course syllabi, higher education institutions not only modernize their teaching methods but also align student learning outcomes with the needs of an increasingly digital labor market. Student feedback indicates strong enthusiasm for AI-driven and interactive tools, yet challenges remain in ensuring equity and sustainability.

Recommendations:

- Expand training sessions for both students and faculty, emphasizing practical digital skills alongside pedagogical adaptation.
- Negotiate subsidized or open-source access **to** essential software, reducing the financial barriers that prevent equal participation.
- Establish continuous feedback loops to refine curricula, ensuring that revisions remain responsive to technological and pedagogical developments.
- Promote interdisciplinary approaches that link digital literacy with critical thinking, creativity, and problem-solving across different fields of study.

Comparative studies between universities in different socioeconomic contexts could reveal best practices for ensuring inclusivity in digital education. Additionally, longitudinal studies are needed to assess how digital competencies acquired during university translate into professional readiness and career advancement. Such evidence would further validate the transformative role of curriculum digitalization in preparing graduates for twenty-first-century challenges.

REFERENCES

Chan, A. Y. W., & Sung, C. M. (2025). Enhancing students' digital literacy skills through their technology use in a course-based research project: A Hong Kong case study. *Asia Pacific Education Review*. Advance online publication. https://doi.org/10.1007/s12564-025-10038-1

European Commission. (2020). *Digital Education Action Plan (2021–2027)* (COM(2020) 409 final). Brussels: European Union. Retrieved from https://education.ec.europa.eu/sites/default/files/document-library-docs/deap-communication-sept2020_en.pdf

Ferrari, A. (2013). *DIGCOMP: A framework for developing and understanding digital competence in Europe* (JRC Technical Reports). Publications Office of the European Union. https://doi.org/10.2788/52966

Ilomäki, L., Paavola, S., Lakkala, M., & Kantosalo, A. (2016). Digital competence – An emergent boundary concept for policy and educational research. *Education and Information Technologies, 21*(3), 655–679. https://www.eu-jer.com/articles/EU-JER_11_3_1729.pdf

Lloyd, S. A. (2012). Faculty-perceived barriers of online education. *MERLOT Journal of Online Learning and Teaching, 8*(1), 1–12. Retrieved from http://jolt.merlot.org/vol8no1/lloyd_0312.pdf

Martin, F., Budhrani, K., & Wang, C. (2019). Examining faculty perception of their readiness to teach online. *Online Learning, 23*(3), 97–119. https://doi.org/10.24059/olj.v23i3.1555

Mejías-Acosta, A., Cabero-Almenara, J., Vázquez-Cano, E., Barroso-Osuna, J., & Estrada-Vidal, L. I. (2024). Assessment of digital competencies in higher education: Developing and validating an instrument. *Frontiers in Education, 9,* 1497376. https://doi.org/10.3389/feduc.2024.1497376

Ng, W. (2012). *Can we teach digital natives digital literacy?* Computers & Education, 59(3), 1065–1078. https://seminarioti.wordpress.com/wp-content/uploads/2013/06/can-we-teach-digital-natives-digital-literacy.pdf

Nowotny, H. (2003). *The potential of transdisciplinarity*. Higher Education in Europe, 28(1), 9–15. Retrieved from https://helga-nowotny.eu/downloads/helga_nowotny_b59.pdf

Redecker, C. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu* (JRC Science for Policy Report). Luxembourg: Publications Office of the European Union. Retrieved from https://publications.jrc.ec.europa.eu/repository/bitstream/JRC107466/pdf_digcomedu_a4_final.pdf

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A., & de Haan, J. (2019). Twenty-first century digital skills for the creative industries workforce: Perspectives from industry experts. First Monday, 24(1). https://doi.org/10.5210/fm.v24i1.9476

Vuorikari, R., Punie, Y., Carretero, S., & Van den Brande, L. (2016). *DigComp 2.0: The digital competence framework for citizens* (EUR 27948 EN). Publications Office of the European Union. https://doi.org/10.2791/11517

CONFERENCE SUMMARY AND REFLECTIONS

Valbona **NATHANAILI**

LOGOS University College
Conference Coordinator

Over the past two years, the HOMO DIGITALIS Project has worked to align digital humanities studies and digital educational media in the Western Balkans with the standards and achievements of the European Higher Education Area. This alignment required rethinking both the concept of competence itself and, more specifically, how digital competencies are defined, taught, and assessed across higher education. Through a series of intensive meetings, trainings, academic exchanges, collaborative debates, and shared learning with leading higher education institutions and distinguished professors, the project laid a solid foundation for this rethinking, particularly in relation to how digital competencies can be taught and meaningfully assessed across disciplines in higher education.

One of the main achievements of the project has been the introduction of digital competencies into non-technological courses within the social sciences. These achievements are now reflected in the contributions to this conference, where a central theme is the exploration of experiences and challenges encountered in integrating digital competencies. This scope was further enriched by our colleagues at POLIS University, who expanded the discussion into architecture, making the conference more interdisciplinary and inclusive.

Yet the introduction of competencies alone is not sufficient; their impact depends on how effectively they can be measured and evaluated, which highlights the responsibility of instructors in shaping assessment practices. Indeed, what proves even more challenging than integration is the question of assessment. As instructors, one of our core responsibilities is evaluation. But how can we meaningfully assess a student's digital competencies? By definition, the competence involves at least three interrelated dimensions: knowledge, skills, and attitudes, which frames the evaluation of digital competencies as potentially measurable through observable outcomes.

Within the European Higher Education Area, this logic is reinforced by the Digital Competence Framework for Citizens (DigComp) created by the European Commission, which functions not only as an assessment tool but also as a pedagogical model, guiding how digital practices are embedded into the syllabus. This perspective is reflected in the contributions of colleagues from LOGOS University College, the University of Sarajevo, and South East European University, who emphasize the structured role of DigComp in curriculum design. The findings from architectural education, however, complement this

structured view by showing that digital competencies often emerge in nonlinear ways, shaped less by attitudes toward technology and more by rhythms, infrastructural access, and dialogical framing by tutors. Patterns of engagement revealed that competence is not a fixed attribute but an evolving condition, constrained by systemic inequalities in resources and enabled by pedagogical mentoring. From this perspective, instructors are not expected merely to teach AI tools as technical packages but to cultivate critical awareness, adaptive reasoning, and ethical framing.

Taken together, these perspectives suggest that while frameworks such as DigComp provide essential benchmarks for defining and assessing digital competencies, their practical realization in specific disciplines requires balancing the responsibility of evaluation with the pedagogical framing that sustains competence over time.

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info@kulogos.edu.al

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