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# Book of Abstracts



**P.PORTO**  
ISCAP



# Innovation, Digital Education, AI and STEAM

## *International Conference*

**Porto Accounting and Business School**

*Polytechnic of Porto*



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IDEAS'26 International Conference

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Book of Abstracts of the International Conference on Innovation, Digital Education, AI and STEAM – IDEAS'26

### **Editors**

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## FOREWARD

This Book of Abstracts accompanies the IDEAS'26 – International Conference on Innovation, Digital Education, Artificial Intelligence and STEAM and provides a structured overview of its scientific and academic program.

The volume includes the abstracts of the plenary talks and workshops, as well as the abstracts of the peer-reviewed scientific contributions accepted for presentation. It reflects the scope and interdisciplinary nature of the conference, encompassing research and practice in the areas of innovation, digital education, artificial intelligence, and STEAM.

The plenary talks, delivered by invited experts, address key developments and emerging challenges in the field. The workshops complement these contributions by fostering interactive discussion and the exchange of applied knowledge. The collection of scientific abstracts presents original research findings, methodological approaches, and case-based studies, offering insight into current trends and future directions.

This publication serves as a formal record of the contributions presented at IDEAS'26 and as a reference for researchers, academics, and practitioners engaged in the advancement of education and technology.

The Organizing Committee wishes to express its sincere appreciation to all authors for their valuable contributions, to the members of the Scientific Committee for their rigorous review process, and to the keynote speakers and participants for their engagement and commitment. We also gratefully acknowledge the support of the partner institutions whose collaboration has been instrumental to the realization of this event.

It is our expectation that IDEAS'26 will foster meaningful dialogue, promote scholarly exchange, and contribute to the development of innovative and sustainable approaches in education and technology.

We want to express our gratitude to all IDEAS'26 participants. Thank you!

The IDEAS'26 General Chairs

*Ana Paula Lopes*  
*Filomena Soares*

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## INVITED SPEAKERS – PLENARY SESSIONS

- **Prof. Matar Mbaye**

Dean of SCBS,  
South Champagne Business School,  
**Troyes, France**



Dean of South Champagne Business School (SCBS) in Troyes, Dr. Matar MBAYE is a sociologist whose work explores the structural transformations driven by digital innovation in education. Formerly a consultant and academic, he has consistently worked at the crossroads of change management, pedagogy, and institutional strategy. Guided by the belief that “*the only tradition worth having is that of change,*” he promotes nevertheless a humanistic vision of higher education that reconciles innovation with meaning, and performance with purpose. His leadership aims to align technology, organisational evolution, and the transformative mission of learning.

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### Plenary Session

#### **Artificial Intelligence as a mirror in abyme: rethinking learning, recognition, and the ontology of the human**

This invited lecture examines artificial intelligence as a mirror in abyme—a recursive reflection of human cognition, culture, and social organisation. Drawing on the work of classical and contemporary thinkers such as M. Mauss, P. Bourdieu, C. Castoriadis and E. Morin, it presents AI as a *fait social total* that reshapes not only the production of knowledge but also the symbolic frameworks underpinning recognition, learning, and institutional legitimacy. In doing so, it raises essential questions about the future of education.

The talk examines three major areas of tension. The first concerns the diminishing role of imagination and the loss of the “invisible” dimensions of human experience—such as emotion, poetic invention, and interpretive nuance—within learning environments that are increasingly data-driven and optimised. The second relates to the sociological divides and cultural marginalisations embedded in algorithmic systems, which call into question the presumed universality of AI and its tendency to produce a global homogenisation of ways of knowing. The third addresses the reconfiguration of certification, validation, and qualification frameworks at a moment when automated processes play a growing role in determining recognition and assessment.

By re-opening the ontological dialogue between human beings and existence, the intervention proposes a renewed understanding of learning as a *dia-poetic* journey—creative, relational, and irreducible to optimisation. It argues that the future of education and knowledge will depend less on the computational power of machines than on humanity’s capacity to preserve imagination, symbolic mediation, and the ethical discernment that give meaning to intelligence.

- **Prof. Renitha Rampersad**

Assistant Dean: Research and Innovation  
Faculty of Business and Management Sciences  
Cape Peninsula University of Technology  
**Cape Town, South Africa**



Professor Renitha Rampersad has a DPhil from the University of Zululand, in South Africa. She is the Assistant Dean of Research and Innovation in the Faculty of Business and Management Sciences at the Cape Peninsula University of Technology. Her research on transformation in business, digitalisation, work integrated learning and women mentorship has contributed to co-edited books and authored chapters in journals. She is involved in national and international funded research projects. She leads a multidisciplinary project on transformation of the socio-economic environment which aligns with digitalisation and infrastructural challenges with BRICS countries.

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## **Plenary Session**

### **Reimagining the University: Past Lessons, Current Realities, Future Directions**

The future of higher education demands that universities innovate by achieving a critical balance.

The traditional educational model has adapted to accommodate flexible learning arrangements in the post-pandemic world. Due to this higher education has had to adjust to an increasingly uncertain and complex future. These challenges include external pressures, such as globalization, and internal pressures, such as a decrease in funding and blended learning approaches. ED4.0 has placed a strong emphasis on cultivating an entrepreneurial mindset and fostering innovation among learners, achieved through project-based learning, internships, and exposure to real-world problem-solving scenarios. The realisation of ED4.0 depends on contextual variables, resource availability, and institutional priorities, with ongoing developments in technology and education likely to enhance or introduce new trends.

Given that learning journeys are entirely flexible and customizable, universities must remain relevant and must reinvent themselves by adapting and delivering through hybrid models that accommodate both synchronous and asynchronous learning.

This article through a descriptive paradigm will reflect not just what the future may hold, but potentially deeper changes in the relationship between universities and their past, present, and future.

- **Prof. Selver Softic**

Full Professor

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Selver Softic is a full professor specialising in, information processing, data mining and data visualisation, as well application of AI in education and process management. He has extensive experience in digital learning innovation, leading activities in Erasmus+ projects such as Gate2Math and AI-Greener and coordinating international teaching initiatives. His current research and teaching focus includes the integration of AI into higher education, learning analytics, and educational data mining.

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## **Plenary Session**

### **Human-Centered Learning Analytics in Education**

This talk explores how Artificial Intelligence can make learning analytics more human-centered in STEAM education. Moving beyond grades and system logs, it highlights how AI can capture engagement, motivation, and sentiment to provide adaptive feedback and empower both students and teachers. The session outlines a visionary roadmap for using learning analytics to enrich the student experience and build bridges across STEAM disciplines.

## IDEAS'26 WORKSHOPS

### Building Generative AI Courses and Fostering Mobility through Joint Delivery

This interactive workshop invites participants to explore how generative AI can be meaningfully integrated into higher education curricula and how cross-university collaboration can enhance learning opportunities and student mobility.

Drawing on the case of TTK University of Applied Sciences, we will present lessons learned from creating and running the course "Using Generative AI Tools in Academic Studies." The session will highlight key stages in course development, including content creation, pedagogical considerations, and feedback from learners.

A second focus is the joint delivery of courses between institutions. Participants will examine the practicalities of co-teaching across borders—such as coordinating academic calendars, grading practices, and digital environments while reflecting on both the benefits and common obstacles of such collaboration.

The workshop features hands-on activities where participants work in small groups to propose enhancements to the course syllabus and co-design a joint delivery plan. The goal is to leave with a refined course concept and a clear direction for future collaboration, including identifying potential partner institutions and outlining initial steps for launching shared initiatives.

**Anne Uukkivi** and **Oksana Labanova**

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**Prof. Anne Uukkivi**



Professor, TTK University of Applied Sciences, Centre for Sciences, Estonia Anne Uukkivi is a professor with a PhD in Information and Communication Science and the Leader of the Research Group of Didactics in Higher Education at TTK University of Applied Sciences. She has designed and taught courses on office software and generative AI tools in education. Her online course has been recognized at the national level. She has organized multiple Blended Intensive Programs (BIPs), promoting student and teacher mobility through joint teaching initiatives with other universities. She has organized several national and international conferences. Currently, she leads an Erasmus+ project and serves as an evaluator for the national e-course quality label competition. Her areas of expertise include AI applications in education, course development, the use of ICT tools

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MSc in Mathematics, is Head of the Centre for Sciences and a mathematics lecturer at TTK University of Applied Sciences. She has extensive experience in teaching STEM subjects and advancing the digital transformation of engineering education. Her expertise includes designing online courses, interactive materials, and using digital and partly AI-based tools to support individual learning paths. She is actively involved in STEM-related national and international projects, promoting student and teacher exchange, especially in engineering. A long-time member of Estonia's e-course evaluation and mathematics exam committees, she has delivered seminars on STEM teaching methodologies, trained

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## Building AI-Powered eLearning Resources in Moodle: From Prompting to Automated Test Creation

This hands-on workshop introduces participants to the use of generative AI tools—such as ChatGPT—for designing and implementing eLearning resources in Moodle. The focus will be on leveraging prompting techniques to create quizzes, interactive tests, and course materials that can enhance both teaching efficiency and student engagement.

Participants will gain insights into:

- How to structure prompts for high-quality, pedagogically sound learning resources.
- Best practices for generating Moodle-compatible tests and exercises.
- Strategies for integrating AI-created content into blended and online learning settings.
- How to transform AI-generated Moodle resources into Open Educational Resources (OERs) and publish them on platforms such as the Gate2Math Smart Library.
- Ethical and quality considerations when using AI in education.

In addition to exploring AI-driven course design, the workshop will highlight opportunities for international collaboration and mobility through joint delivery of AI-enhanced modules. Participants will be invited to experiment in small groups by generating Moodle resources, turning them into OERs, and co-developing ideas for cross-university course delivery.

By the end of the session, attendees will leave with practical resources, a roadmap for implementing AI-supported teaching practices in Moodle, and a vision for fostering mobility and open knowledge sharing through AI-based teaching initiatives.

### **Selver Softic** and **Safet Softic**

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*Prof. Selver Softic*



Lecturer, CAMPUS 02 University of Applied Sciences, Graz, Austria  
Selver Softic is a full professor specialising in, information processing, data mining and data visualisation, as well application of AI in education and process management. He has extensive experience in digital learning innovation, leading activities in Erasmus+ projects such as Gate2Math and AI-Greener and coordinating international teaching initiatives. His current research and teaching focus includes the integration of AI into higher education, learning analytics, and educational data mining.

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## Let's Improve Moodle Together - A Collaborative Design Workshop

Moodle is a learning platform used by many institutions. Both teachers and learners are familiar with and use this platform in education. However, while the platform provides learners with essential information, it is not particularly appealing and does not necessarily correspond to the usual image of a usable Internet platform.

In this interactive workshop, teachers are invited to make a course page more attractive. Using a current course from CAMPUS 02 University of Applied Sciences, we will show how a Moodle course can be structured so that different topics can be covered as individual lessons. We will present the possibilities for integrating existing Bootstrap elements such as cards and tip tools into the Moodle course and adapting them to your own needs. It will also show how easy it is to integrate and adapt other tools such as interactive GeoGebra parts and H5P elements.

Together with the participants, we will first work out the structure of a course and the possibilities for implementation. Step by step, we will create the individual blocks of the course and explore the possibilities for changing and adapting existing web elements.

The workshop therefore includes practical activities in which participants work in small groups to improve a Moodle course in terms of design and usability. The aim is to design a Moodle course in such a way that it provides a better overview of the individual topics covered in the course and engages learners more effectively with the help of interactive elements.

***Eva Schirgi*** and ***Daniela Haumer***

---

**Prof. Eva Schirgi**



Teaching and Research, CAMPUS 02 University of Applied Sciences, Graz, Austria  
Eva Schirgi is a full-time mathematics lecturer at CAMPUS 02 University of Applied Sciences and coordinator for data science. She has designed and delivered courses in mathematics and statistics and created online teaching materials. She is also largely responsible for creating the online course for school mathematics, which is being implemented across all departments at CAMPUS 02 in order to close gaps in school education.

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Daniela Haumer is a project assistant at CAMPUS 02 University of Applied Sciences, supporting various projects within the Department of Information Technology & Business Informatics. She is currently involved in the development and delivery of training programs for children on the fundamentals of artificial intelligence, as well as contributing to projects related to sustainability.

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## Interactive OER for STEM: From Idea to Integration

How can we make STEM teaching more engaging without spending weeks developing new materials? How do we find open, high-quality resources that we can actually use — and share legally?

This interactive workshop offers clear answers and practical solutions.

Together, we will explore how to create interactive tasks and visualizations using H5P and GeoGebra, and how to integrate the language of mathematics through LaTeX — step by step and without the need for advanced programming skills. Participants will learn how to turn existing materials or ideas into dynamic, learner-centered experiences that can be easily shared and embedded across digital learning platforms and LMS environments.

During the workshop, participants will learn how to:

- Create interactive exercises and visual STEM activities using H5P, GeoGebra, and other open tools;
- Find high-quality open resources from trusted OER repositories;
- Adapt existing materials to fit their own teaching goals and student needs;
- Understand the essentials of Creative Commons licensing — how to reuse, attribute, and license their own materials responsibly;
- Integrate the created resources into various learning platforms and LMS environments.

After the workshop, each participant will receive an online step-by-step guide — “From Idea to Integration: Creating Interactive OER for STEM” — summarizing the full workflow from idea generation to creation, licensing, and integration.

Whether you’ve never built a digital exercise before or you’re looking for new ways to share your expertise, this session will help you transform your teaching materials into engaging, shareable, and open STEM resources — in less time than you think!

***Yevheniia Andriichenko***

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# Scientific Contributions



# Abstracts



## ABSTRACTS – Scientific Contributions

This section comprises the abstracts of all works presented in person during IDEAS'26 International Conference, whether delivered as Oral Communications or Poster presentations. Each contribution provides a succinct account of the research objectives, methodologies, and principal findings shared by the authors, thereby enriching the scientific and academic discourse fostered throughout the event.

Collectively, these contributions illustrate the diversity of perspectives and analytical orientations, in distinct Scientific Areas, that informed the academic discussions throughout this international event.

The texts reproduced herein are the sole responsibility of their respective authors, who retain full accountability for the accuracy, coherence, and interpretative positions expressed in their submissions.

# A conceptual architecture for optimizing IT Project Management using RPA and AI

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**Abstract**—The increasing complexity of IT development projects requires new approaches for optimizing project management processes. This paper proposes a conceptual framework for Project Management optimization in IT projects through the integration of Robotic Process Automation and Artificial Intelligence. The framework is structured into three layers: Process Layer, Automation Layer, and Optimization Layer, addressing process design, automated execution, and intelligent decision support. AI-based agents are introduced to analyze project data and generate recommendations for improved planning and resource utilization. A conceptual case study based on an IT project managed using Jira is proposed to illustrate the applicability of the framework. The proposed approach aims to reduce administrative effort, enhance transparency, and support continuous improvement in IT project management.

**Keywords**—Project Management, Robotic Process Automation, Intelligent Agents, Framework, IT Development projects, Jira

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# A Simplified Evaluation Method Used for Unsupervised Learning Algorithms

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**Abstract**—Professional evaluations for unsupervised learning algorithms are a crystal important and challenging topic due to its input-output specialty. There are no output labels available in unsupervised learning models to work as an evaluation criterion to check and compare the predicted outputs with the actual outputs. In other words, it is relatively difficult to effectively estimate or validate the correctness or efficiency of any unsupervised learning algorithms with regular methods used in supervised learning studies. In this study, we developed a simplified evaluation method by using average or mean values for testing observations and comparing them with the mean values of clustered observations to identify their correctness of their clustering. This method can be used to effectively perform some evaluations for unsupervised learning models. A comparison between our method with some traditional evaluation methods, such as Silhouette Scores, is performed and the comparison result shows that our method is better than that traditional method.

The experimental study confirmed the effectiveness of our evaluation methods used for unsupervised learning algorithms, and the correct evaluation rate is up to 97%.

**Keywords**—Evaluations of unsupervised learning algorithms, internal validation metrics, Silhouette scores, Calinski-Harabasz index, Davies-Bouldin index, Dunn index, Diabetes dataset

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# Active and Collaborative Learning through Mathematical Problem Solving in Engineering

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**Abstract**— This work presents the design and implementation of an activity developed within the Mathematics I curricular unit of the Electrical Engineering – Electrical Power Systems degree at the School of Engineering of the Polytechnic Porto.

The activity was motivated by the intention to integrate active learning methodologies into higher education, encouraging students to assume a more participatory role in the learning process and promoting a deeper understanding of mathematical concepts. It was structured around three compulsory components: the preparation of a written report, the production of an educational video with a clear explanatory and didactic purpose, and an oral presentation delivered in pairs. The production of the video constituted the central element of the pedagogical proposal, as it required students to explain mathematical concepts and the resolution of specific problems in a clear, accurate, and accessible manner. This process encouraged students not only to solve the proposed problem but also to organise their reasoning and communicate mathematical ideas effectively.

A central aspect of the activity was the use of the Padlet platform as a collaborative learning environment. After the production stage, all videos were shared on this platform so that they could be accessed by all students. The use of Padlet played a fundamental role in the activity, as it enabled students to view their peers' work, comment on it, and provide constructive feedback. This interactive space fostered reflection, critical thinking, and collaborative learning, while also encouraging students to engage with different approaches to explaining and solving mathematical problems. Furthermore, the peer-feedback process supported the development of self-regulation in learning and promoted the acquisition of transversal skills, including digital literacy, teamwork, and communication abilities. The use of Padlet also contributed to creating a shared repository of student-produced learning resources, reinforcing the sense of community within the class.

The results suggest increased student motivation, participation, and engagement with the subject. In addition, the need to produce explanatory videos and interact through Padlet appears to promote deeper conceptual understanding, highlighting the potential of digital collaborative platforms and student-generated content as innovative pedagogical strategies in higher education mathematics.

**Keywords**—Active learning; Collaborative learning; Mathematics; Mathematical problem solving; Engineering; Higher education; Student engagement; Student-generated content.

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# Advantages and limitations of digital didactic models' adoption in the age of IA

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**Abstract** — The didactic integration of digital technologies in higher education often fails to achieve its intended impact, as effectiveness depends heavily on the specific methods of implementation. This paper presents a systematic literature review aimed at identifying the most prevalent didactic models adopted by higher education teachers in the context of digital education, while pointing out their respective advantages and limitations.

Following a comprehensive screening of 1919 articles from Scopus, Web of Science and Open Research Europe for the time frame of 2020 to 2024, 19 studies were selected for inclusion. The Technological Pedagogical Content Knowledge framework emerged as the dominant model, featured in 10 of the analysed studies. This was followed by constructivist models in two studies, while seven alternative approaches were represented by a single study each. Notably, only one study addressed the integration of generative artificial intelligence, specifically focusing on the adoption of the didactical tetrahedron regarding ChatGPT in educational activities.

The primary advantages of these didactic frameworks include enabling teachers to tailor instruction to diverse technological tools and student needs, supporting student-centred learning environments, enhancing engagement and assessment processes, and promoting reflective teaching practices. Conversely, several challenges were identified, including inadequate institutional support, disparities in digital competence, the requirement for more reliable assessment tools, and the difficulty of maintaining student motivation within fully online settings.

The findings reveal that significant heterogeneity in model definitions and research contexts limits the comparability

across studies. While Technological Pedagogical Content Knowledge remains the primary framework for digital didactics, underexplored models offer valuable complementary insights into technology-enhanced learning, including generative artificial intelligence. This study concludes that future research should prioritize context-specific adaptations and the exploration of hybrid didactic approaches to better address the complexities of modern higher education.

**Keywords** - Digital Education; Didactic Models; Didactic Frameworks; Higher Education

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# AI-based agent to enhance personalized learning process: a case study

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**Abstract**— Learning computer programming remains a challenging endeavor for many beginners, often associated with fear, low confidence, and reduced motivation. In the era of generative artificial intelligence, AI based agents offer new opportunities to enhance teaching and learning by providing personalized, context aware support. In fact, the AI-based agent could provide students with more personalized support, focused on the specific content available on Moodle, enabling tailored summaries, clarification of doubts, and the proposal of exercises aligned with course materials.

This study presents the design, implementation, and evaluation of an intelligent educational agent developed to support introductory programming courses in higher education. A systematic literature review informed the pedagogical and technological foundations of the system, guiding the selection of tools based on usability, feedback quality, and alignment with instructional objectives. The resulting agent delivers real time assistance, automated feedback on programming tasks, and personalized learning recommendations grounded in Moodle course content. The results demonstrate that the agent contributes to increased student engagement, enhances the learning process, supports problem-solving processes, and promotes the development of foundational programming skills.

A pilot study with undergraduate students, combining interaction logs, surveys, and academic performance indicators, shows that the agent effectively supports learning and fosters student engagement. The findings highlight the potential of AI driven educational agents when integrated within robust pedagogical frameworks, to improve learning outcomes in programming education. The study also outlines practical implications for the development of adaptive learning support systems and identifies promising directions for future research in intelligent educational technologies.

**Keywords**— programming learning, teaching methodologies, Generative Artificial Intelligence, AI-based agents

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# AI in Higher Mathematics Education: Insights from Europe and Portugal

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**Abstract**— This article presents a comparative literature review of European research and studies conducted in Portugal on the use of Artificial Intelligence—specifically Generative AI systems—in higher STEM education, with a particular focus on mathematics education. The review maps the current state of knowledge and identifies points of convergence, divergence, and gaps in the literature. Drawing on studies published between 2023 and 2025, it is based on a systematic search of the Scopus, ERIC, and Google Scholar databases.

The analysis examines the methodological approaches adopted across the selected studies, the types of AI technologies employed, the mathematical domains addressed, and the learning outcomes reported. European research demonstrates greater methodological diversity, although it frequently lacks alignment with established principles and theoretical frameworks in mathematics education. In contrast, research conducted in Portugal remains in an early stage, predominantly descriptive, and largely focused on students' and lecturers' perceptions.

Overall, the findings indicate that, despite rapidly growing interest in the integration of Generative AI in tertiary mathematics education, significant gaps persist. This article highlights the need for more rigorous, context-sensitive, and theoretically grounded research—particularly within the Portuguese higher education system.

**Keywords**— Artificial Intelligence, Generative AI, Higher Education, Mathematics, Mathematics Education, STEM

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# AI: the necessary and the possible regulation

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**Abstract**— Given the reality of Artificial Intelligence (AI)’s presence in the most diverse spheres of modern life, significantly affecting it in various ways, the law cannot fail to address this new reality. Given the extent that it impacts our lives, AI must be subject to rules; it cannot be a lawless reality, devoid of rules and regulatory principles.

Thus, first and foremost, the aim of this communication is to analyze the fields in which AI currently poses the greatest challenges, namely in the areas of the economy and labor, health, education, and privacy.

Second, starting from the search for a definition of AI that allows for the establishment of the boundaries of the application of the rules governing it, we will seek to critically analyze the regulatory principles of AI, as set forth in the recent REGULATION (EU) 2024/1689 of the European Parliament and of the Council of June 13, 2024, which will enter into force on August 2, 2026.

This EU regulation aims to establish harmonized rules on artificial intelligence through a uniform legal framework, “in particular for the development, placing on the market, putting into service, and use of artificial intelligence systems (AI systems) in the Union,” by setting rules that ensure the use of AI is consistent with the Union’s values, namely democracy, the rule of law, environmental protection, and protection against the harmful effects of AI systems in the Union, without hindering innovation in Europe.

**Keywords**— artificial intelligence, EU Regulation, harmonization, rule of law

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# Aligning Higher Education Outcomes with Digital Labour Dynamics and ICT Employment Trends

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As digital transformation advances, traditional labour market metrics fail to capture the complexity of human capital utilisation in the Information and Communication Technology (ICT) sector. This research addresses the growing gap between higher education output and official employment statistics, driven by the emergence of new forms of employment. The study aims to diagnose structural shifts in ICT labour market intelligence and evaluate how digital labour dynamics, such as platform-based engagement and crowd- or collaborative employment, influence perceptions of a shortage of a qualified workforce. The study is based on a statistical analysis conducted in Latvia. The methodology employs a mixed-methods approach integrating secondary statistical data from national labour and education databases with a targeted primary survey of ICT professionals and graduates. The study utilises an analysis of graduate statistics in relation to national vacancy trends. The results point to a statistically significant divergence between the ICT-qualified workforce and the employment variable. Findings reveal that a substantial segment of highly qualified specialists engages in global digital networks and new forms of employment that remain underreported in national accounting and sector productivity metrics. The skill-gap analysis further identifies a mismatch between traditional academic curricula and the autonomous digital competencies required by the global market. The study shows the perceived labour deficit is partially a methodological artefact. To enhance business intelligence and policy effectiveness, national metrics must be adapted to encompass new forms of employment, ensuring accurate human capital valuation and sustainable national competitiveness in the digital era.

**Keywords—** Labour market intelligence, New Forms of Employment, Qualified workforce metrics, Higher Education outcomes, ICT sector

# Application of the Python Programming Language and Artificial Intelligence in Economics

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**Abstract**—Economists on a daily basis monitor and analyze large volumes of data. In their work, they use various software tools to facilitate data entry, processing, visualization, and analysis. Most of these tools are commercial and require payment for use. In the past, several months were needed to conduct analyses and comparisons of the gross domestic product of several countries. Today, with the help of the Python programming language and artificial intelligence (AI), it is possible to obtain a large amount of economic data from various databases in a much shorter time and to perform their analysis.

The Python programming language has been chosen due to its simplicity, openness, and widespread use. The paper discusses several applications of this programming language in economics. Compared to other programming languages, Python is not the fastest nor the simplest; however, it arguably offers shorter code and easier programming with the assistance of AI. Like any other skill, programming requires patience and persistence from beginners. A facilitating factor in the learning process is the ability to test the invested effort very quickly on a computer.

The paper presents a practical example of a program for analyzing stock price movements, which can be generated with the assistance of AI. The paper presents a practical example of an AI-assisted program designed for the analysis and comparison of gross domestic product across multiple countries. The idea is to demystify the complexity of learning and problem solving, while simultaneously emphasizing the necessity of understanding the basic tools being used in order to efficiently leverage the support of AI technologies.

**Keywords**—Python, artificial intelligence, economics, analysis, practical example

## AUTHOR CONTRIBUTIONS

Srdjan Damjanovic was responsible for writing the introduction, the literature review, and the conclusion of the manuscript. Predrag Katanic developed and implemented the program codes used in the study. Vesna Petrovic selected the economic case studies for which the programs were developed and performed the translation of the manuscript into English. All authors contributed to the overall conception of the work, reviewed the manuscript critically, and approved the final version of the paper.

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# Artificial Intelligence and Data Analytics in International Logistics: Enhancing Operational Efficiency and Strategic Decision-Making

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**Abstract**— International logistics has become increasingly complex due to persistent disruptions in global supply chains, cost volatility, and growing sustainability pressures. In response, organisations are progressively incorporating Artificial Intelligence (AI) and data analytics into their operations to enhance efficiency and support more informed managerial decision-making. These technologies are being applied in areas such as demand forecasting, route optimisation, inventory management, and risk mitigation across international supply chains.

This study aims to examine how AI and data analytics are currently being applied in international logistics, with particular emphasis on their contribution to operational performance and decision-making processes. The research adopts a qualitative and exploratory approach, based on a structured review of the literature combined with the analysis of selected real-world applications from logistics and transport organisations.

The analysis suggests that the integration of AI and data analytics is associated with measurable improvements in operational efficiency, particularly in terms of cost reduction, delivery reliability, and enhanced supply chain resilience. At the same time, these technologies appear to support more structured and data-driven strategic decisions in increasingly uncertain environments. However, their effective implementation remains uneven across organisations, with challenges related to data quality, technological integration, organisational readiness, and the availability of specialised skills.

This study contributes to the ongoing discussion on supply chain resilience and the role of digital technologies in management, highlighting the strategic importance of AI-driven approaches in international logistics. It provides insights for both researchers and practitioners, reinforcing the relevance of data-driven managerial decision-making as a key capability in contemporary organisational contexts.

**Keywords**— International Logistics, Artificial Intelligence, Data Analytics, Supply Chain Management, Managerial Decision-Making, Supply Chain Resilience

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# Artificial Intelligence and Global Challenges: Insights from an Exploratory Survey of Public Opinion

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**Abstract**—The world is facing rapid, vast and profound societal transformations that challenge human confidence of persons and things. Developments in the field of Artificial Intelligence (AI) have been explored in relation to the need to tackle these complex challenges and to generate social good. However, misinformation and disinformation about AI (and generated by AI itself) have been identified as one of the major global risks for the future. This study is part of a broader research project analysing the potential of AI to support complex modes of thinking in the face of current global challenges, examining the potentialities, constraints, and risks [1]. It aims to examine public opinion on AI, specifically representations of AI, its possible impacts, and the trustworthiness of institutions that regulate AI. To achieve this aim, an online survey comprising closed and open-ended questions was conducted within the three-phase model of social representations theory framework [2] in 2024 (N=383). The results of the free association of words shows that AI is mainly associated with the “future”, “robots”, “technology” and “innovation”. Two opposing positions on AI were found; (i) Supporters associate AI with potential benefits in line with technological optimism, such as automation, speed and efficiency; (ii) Critics, stress the degradation of social and human values. These two groups also differ in terms of the likelihood that they would consider using AI and the level of trust they place in the information they obtain from AI use for different purposes, including academic tasks. The results point to the need to stimulate further public initiatives to discuss the potential impacts of AI in society as well as on the role of institutions in its regulation.

**Keywords**— artificial intelligence, public opinion, positive and negative impacts, use and trust, regulation

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# Artificial Intelligence and More-Than-Human Creativity

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**Abstract**— This theoretical proposal critically examines the debate surrounding artificial intelligence (AI) and the potential replacement of human creativity, arguing that such discussions remain constrained by anthropocentric assumptions about what constitutes creativity. Rather than asking whether AI can replicate or surpass human creativity, the paper interrogates the theoretical foundations of claims about human exceptionalism in creative matters. The dominant positions in the literature tend either to deny AI creativity—arguing that machines lack emotional, intentional, or experiential dimensions central to human creativity [1,2]—or to affirm it by demonstrating that AI systems can perform successfully in psychometric and social evaluations of creativity designed for humans [3]. Both positions, however, rely on human-centered criteria.

This theoretical proposal moves beyond the dichotomy between human and artificial creativity toward a “more-than-human” understanding of creative processes. Existing research on AI-generated art reveals that aesthetic judgments are strongly shaped by anthropocentric biases: people often undervalue artworks labeled as AI-generated despite evaluating them positively when their origin is unknown [4,5]. These findings highlight how perceptions of creativity depend less on intrinsic qualities of the artifact than on socially constructed expectations about authorship and agency [6,7].

To challenge these assumptions, it is introduced the concept of an “Aesthetical Aversion Turing Test,” which evaluates AI creativity through the discomfort or resistance experienced by humans when they discover that a work they admired was produced by a machine. This proposal reframes anthropocentric bias not as an obstacle but as an indicator of shifting boundaries between human and machine creativity. Ultimately, it is argued that AI should not be understood as threatening human creativity but as revealing the historically hybrid, technological, and relational nature of humanness itself. By engaging with AI as a creative agent, humans may expand creative practices and develop new forms of more-than-human creative collaboration [8–10].

**Keywords**— Artificial intelligence, Creativity, More-than-human, Anthropocentrism

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# Artificial Intelligence and the Changing Conditions of Learning and Knowledge: Insights from a French Business School

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**Abstract**— This paper begins with a specific empirical observation drawn from a French business school. Based on an analysis of almost 2,000 final dissertation grades collected over four academic years, it identifies two interrelated trends: a general increase in grades and a widening gap between written and oral assessments. These developments occurred as generative artificial intelligence became integrated into students' everyday working practices and gradually established itself as a recurring feature of academic work. Such observations do not, in themselves, establish causality. They nevertheless provide a robust empirical basis for questioning the changing conditions of learning, assessment, and knowledge acquisition in management education.

The paper does not approach this development primarily through the lens of academic integrity. Its central concern lies in the cognitive, intellectual, and ultimately professional consequences of delegating part of academic work to artificial intelligence. Existing research has already highlighted the effects of these tools on learning processes, knowledge incorporation, and what may be described as an illusion of knowledge. Students may produce documents that are formally convincing, well structured, and academically acceptable while engaging less directly in memorisation, conceptual articulation, contextualisation, and critical analysis. What is at stake, therefore, is not only academic performance, but the substance of professional competence. From this perspective, management education risks drifting towards a more pragmatic and empirical model of knowledge, in which acceptable outputs increasingly take precedence over conceptual mastery, analytical capacity, and critical judgement. Business schools are thus confronted with a pressing question: how can they continue to certify outputs without guaranteeing the same degree of intellectual formation?

In this context, the issue extends beyond pedagogy and academic performance. A sociological interpretation suggests that artificial intelligence functions both as an agent of

transformation and as a revealer of the conditions through which management has historically been institutionalised and legitimised. If, from the education stage onwards, future members of the “trustworthy salaried class” lose some of the resources that once grounded their usefulness and legitimacy—structured knowledge, discursive command, and conceptual backbone—their place within the managerial order cannot remain unaffected. The growing reliance on artificial intelligence may therefore signal more than a change in study practices. It may also contribute to a weakening, and perhaps a numerical contraction, of managerial strata, as more future managers come to depend on processed and externalised forms of cognition. From this standpoint, the paper opens a broader reflection on the future of management as a social function in the age of generative AI.

**Keywords**— Artificial intelligence, , management education, learning, professional competence, symbolic domination

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# Artificial Intelligence applied to legal education

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**Abstract**— The application of Artificial Intelligence (AI) to legal education has enabled the analysis of legal contexts in virtual environments and the implementation of innovative methodologies in the teaching of law.

AI offers a range of fundamental possibilities for teaching, provided it is used by its users ethically and responsibly. AI is profoundly changing the way law is learnt and taught, as it enables the intelligent use of platforms with various capabilities and, in this sense, represents a fundamental tutoring system for students and trainers. Through AI, a considerable volume of supporting information essential to teaching and scientific research is conveyed. It is a tool that facilitates access to information and provides its users with extensive legal knowledge, whilst also ensuring personalised, practical and user-oriented learning. It is also presented as an effective tool that enables skills development.

It has enabled the use of more innovative methodologies in the study and practice of law, facilitated the case method, the application of game theory, the practical analysis of real-life cases (legal clinics) and, ultimately, a new way of thinking about law (design thinking).

Building on these possibilities, legal pedagogy has evolved towards more active models, with the aim of training professionals who are critical, creative and prepared for more complex contexts.

This is particularly the case in legal proceedings where AI enables an analysis of judicial decisions and legal doctrine to identify the direction of case law and thus guide legal practitioners towards the best application of the law. Drawing on available databases, AI ensures a comprehensive analysis and greater predictability of judicial decisions. It can thus be used as a tool for standardising case law, which is fundamental for all its users, as well as for more effective case management and, consequently, the optimisation of legal strategies.

As it is a tool capable of collecting and analysing a whole range of information, it also allows for better legal interpretation in relation to any specific case that the lawyer wishes to see resolved or clarified. It can even serve as a legal simulator, such as a virtual court, thereby ensuring an analysis of legal contexts and interaction between the AI and its user.

As a virtual platform, similar to Moodle, it thus contributes to modern legal education, as well as to the development of legal discussion forums or role-play scenarios; it can even be seen as a hybrid learning mechanism, offering the advantage of a degree of flexibility and greater interaction outside the traditional classroom.

With this new tool, we are moving towards a new paradigm, with a more analytical and predictive approach to teaching, provided, of course, that we are able to make more active and responsible use of these technologies, which can promote learning that is more focused on its target audience.

**Keywords**— Teaching; learning; methodology; law; interaction

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# Artificial Intelligence in Language Teaching: Benefits, Challenges and Teachers' Perspectives

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**Abstract**—Artificial intelligence has a longer history in education than is often assumed, with early applications dating back to the development of computer-based tutoring systems in the twentieth century. This paper examines the role of artificial intelligence in language teaching, focusing on its pedagogical benefits, limitations, and the perspectives of English language teachers in the Republic of Srpska. The study combines a review of relevant literature with an empirical survey conducted among 48 teachers working in primary and secondary schools. The results indicate that artificial intelligence tools can support personalized learning, enhance language skill development, and improve administrative efficiency by assisting with lesson preparation and assessment. At the same time, teachers express concerns regarding reduced human interaction, ethical issues related to data privacy, and unequal access to technological resources. The findings reveal a generally positive but cautious attitude toward the integration of artificial intelligence in language education, accompanied by a strong need for professional development and institutional support. The study contributes to a clearer understanding of how artificial intelligence can be implemented in language teaching in a balanced and human-centered manner, emphasizing that technology should complement rather than replace the role of the teacher.

**Keywords**—artificial intelligence, language teaching, personalized learning, educational technology, teacher attitudes.

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# Artificial Intelligence in Non-Financial Reporting: Opportunities and Risks in Theory and Practice

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## Abstract

Artificial intelligence (AI) plays a significant role in shaping the future of corporate reporting, including sustainability and environmental, social, and governance (ESG) reporting. A growing body of academic research examines both the opportunities and the risks associated with the application of AI in corporate reporting practices.

AI is already being employed in the presentation of managerial information, the drafting of selected sections of corporate reports, the enhancement of report security, and the analysis of large volumes of textual data. An increasing number of organizations are also recognizing the potential of AI in the analysis and reporting of non-financial information, particularly in the area of ESG reporting.

The use of AI-based algorithms in the generation of non-financial reports may enable the provision of more accurate, comprehensive, and decision-useful information, thereby supporting assessment of organizational business models and long-term sustainable development.

However, the use of AI in non-financial reporting is also associated with numerous challenges, including ensuring transparency and accountability for the information presented, compliance with applicable regulations and ESG reporting standards, as well as data protection and the prevention of manipulative or misleading uses of AI in non-financial reporting.

An additional challenge concerns education in this area, particularly the need to expand academic knowledge and to modify or supplement finance and accounting curricula and course syllabi with content addressing the use of AI in non-financial reporting. Undoubtedly, the primary objective of education on the application of AI in non-financial reporting is to maintain an appropriate balance between traditional approaches to the preparation and analysis of non-financial reports and the use of AI-based solutions.

This article examines the potential benefits and risks associated with the application of AI in non-financial reporting and addresses the issue of transferring academic knowledge in this area. It presents the results of a survey-based study on the potential use of AI in non-financial reporting among various stakeholder groups. The empirical research conducted was exploratory in nature and focused on the respondents' experiences and subjective perceptions.

The authors also sought to address whether stakeholders are prepared for the rational use of AI in non-financial reporting, with an awareness of potential risks and interpretative errors, and whether they expect changes in education and training in this area.

The article addresses a timely and still relatively underexplored area of contemporary accounting, namely the use of AI in non-financial reporting, and presents the results of empirical research identifying both the benefits of AI implementation in reporting and the related educational needs. The article partially fills a research gap and contributes to the ongoing discussion on the use of modern technologies in corporate reporting.

## Keywords

non-financial reporting, disclosure quality, artificial intelligence

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# Artificial Intelligence Literacy as a Challenge for Higher Education - A case study at the Portalegre Polytechnic University

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**Abstract**— This study analyses artificial intelligence (AI) literacy in higher education, using the Portalegre Polytechnic University (PPU) as a case study. The main objective was to assess the level of AI literacy among faculty and students, identifying competences, weaknesses, and pedagogical implications. A psychometrically validated questionnaire was applied, supported by statistical analysis and qualitative interpretation.

The results show an intermediate level of AI literacy in both groups, although with distinct profiles. Faculty members demonstrate greater conceptual and ethical awareness but reveal significant limitations in continuous learning and keeping up with technological advances. Students, on the other hand, display high self-confidence in self-management and resistance to algorithmic persuasion, while showing relevant weaknesses in technical understanding and adaptive learning capacity. The widespread use of AI tools, particularly ChatGPT, confirms their integration in academic practices but raises critical challenges regarding integrity, self-regulation, and assessment.

The study concludes that AI literacy should be considered a strategic priority in higher education, requiring dynamic and multidisciplinary training programs that integrate technical, cognitive, and ethical competences. Such initiatives are essential to foster responsible and critical use of AI in educational contexts.

**Keywords**— Artificial intelligence literacy, Higher education, Teachers, Students, Ethics, Regulation, Digital education

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# Boothmate: Integrating a Terminology Management Application in Interpreter Training

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**Abstract**—Terminology preparation is a crucial component within interpreter training, particularly in specialised contexts where cognitive load and time constraints are significant. This study analyses the pedagogical integration of Boothmate, a digital terminology management application, in interpreting practice. The aim of the study is to learn if the tool can enhance students' terminological competence and preparation strategies. The research focuses on the implementation of the platform within a higher education setting, where it was used as part of structured curricular activities designed to emulate professional interpreting scenarios.

The study adopts a mainly quantitative, practice-based approach. Students were required to elaborate, organise, and use thematic glossaries as part of their preparation for interpreting tasks. Data were collected through a survey related to these classroom practices, in which students were asked to provide feedback on the tool's applicability. The methodology focused on guided terminology research, collaborative glossary building, and the use of prepared terminology during simultaneous interpreting tasks in a mock conference scenario.

The results seem to indicate that the use of a dedicated terminology management tool helps students to better prepare interpreting tasks in a more systematic way, improves conceptual understanding of specialised domains, and enhances their ability to retrieve relevant terms under time constraints.

The study concludes that integrating a digital terminology management tool into interpreter training can significantly contribute to the development of professional skills, provided that their use is embedded within a structured and reflective pedagogical framework. These findings have implications for curriculum design and for the incorporation of technology into interpreter training.

**Keywords**—interpreting, interpreter training, terminology management, boothmate, technology,

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# Breaking Barriers: Social, Cultural and Organizational Factors Affecting Girls' Participation in Renewable Energy Careers

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**Abstract**—The global transition toward renewable energy requires a highly skilled workforce capable of addressing complex technological and environmental challenges. However, despite growing demand for talent in renewable energy and related STEM fields, women remain significantly underrepresented in these sectors. This gender imbalance limits both social equity and the diversity of perspectives necessary for sustainable innovation. Understanding the barriers that prevent girls from pursuing careers in renewable energy is therefore essential. This paper explores the social, cultural, and organisational barriers that influence girls' participation in renewable energy sectors. It is based on a structured literature review and empirical insights gathered from the STAR Girls project, an educational initiative aimed at inspiring girls in STEAM. The project promotes their interest through mentoring, hands-on activities, and exposure to female role models in technical professions. The study addresses the following research question: What social, cultural and organizational barriers limit girls' participation in renewable energy careers, and how can educational initiatives address these challenges? Based on a structured literature review, the paper identifies key factors shaping girls' career choices. At the social and cultural level, gender stereotypes, family expectations, and the lack of visible female role models contribute to reinforcing the perception that technical and energy-related careers are male-dominated fields. At the organizational level, limitations in school curricula, insufficient career guidance, and structural inequalities within technical education systems further constrain girls' engagement with STEM pathways. Building on these insights, the paper proposes a conceptual framework that integrates barriers across three analytical levels: micro (individual perceptions and aspirations), meso (family and school influences), and macro (institutional and cultural norms). This framework seeks to clarify how multiple dimensions interact to shape girls' participation in renewable energy careers. The study concludes by discussing policy and educational implications, highlighting the importance of gender-sensitive educational initiatives, early exposure to STEM fields, and the promotion of female role models to foster greater gender inclusion in the renewable energy sector.

**Keywords**—Renewable energy careers, Gender gap in STEM, Girls' participation, Social and Organisational barriers, Conceptual framework, Education.

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# Competency to Culture: Organisational Factors Influencing the Implementation of Healthcare Quality and Patient Safety Frameworks in South Africa

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**Abstract—** Background: While competency-based training improves knowledge in healthcare quality and patient safety, translation into practice depends on organisational readiness, leadership support, and system culture. Limited evidence exists on how organisational factors shape the effectiveness of quality improvement (QI) capacity-building initiatives in Low- and Middle-Income Countries (LMICs).

**Objective:** To identify organisational barriers and enablers influencing the implementation of a healthcare quality and patient safety framework following a structured training intervention in South Africa.

**Methods:** This study reports the organisational analysis component of a larger mixed-methods evaluation of a national quality and patient safety training programme. Quantitative pre- and post-assessments measured changes in knowledge and confidence (Kirkpatrick Level 2), while qualitative feedback (Level 1) explored organisational contexts influencing application of learning. Thematic analysis identified recurring barriers and enablers, which informed the development of an implementation framework.

**Results:** Although statistically significant improvements in knowledge were observed across all domains ( $p < 0.05$ ; 42% overall reduction in novice/beginner ratings), qualitative findings revealed substantial organisational constraints. Key barriers included limited resource allocation (29%), lack of incentives (50%), resistance to change (41%), siloed QI activities (38%), and incomplete staff engagement (66%). Enablers included leadership recognition of QI value (73%), supportive organisational culture (63%), and high demand for further quality management systems (QMS) training (66%). These findings informed a contextual implementation framework highlighting the interaction between individual competency, organisational culture, structural supports, and policy alignment.

**Conclusion:** Training interventions improve competency but are insufficient in isolation. Sustainable implementation of healthcare quality frameworks requires leadership commitment, protected resources, aligned incentives, mentorship

systems, and integration into institutional quality governance structures. Organisational culture emerges as a critical mediator between learning and sustained system improvement.

**Keywords—** Healthcare quality, patient safety, organisational culture, quality improvement, implementation framework.

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# Competing in a Digital Economy: The Role of Globalisation, Digitalisation and Intangible Assets in European High-Tech Firm Performance

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**Abstract**— This study analyses the impact of globalisation, digitalisation and intangible assets on the performance of European high-tech companies listed on the STOXX600 index. In a context marked by rapid economic and technological change, companies face growing pressure to adopt strategic digital initiatives and develop new business models that ensure long-term competitiveness and sustainability. The research is based on a five-year panel dataset covering 98 companies with 490 observations, enabling an empirical assessment of the relationship between these factors and firm performance.

Globalisation is measured using the KOFGI index, developed by the KOF Institute, which integrates economic, social and political dimensions, including de facto and de jure indicators. The results show that higher levels of globalisation have a positive and significant impact on corporate performance, suggesting that countries' ability to cope with globalised markets leads to better corporate results.

Regarding digitalisation, this is operationalised through content analysis of annual reports, counting the frequency of terms associated with the concept of 'digital'. The results indicate that, in the short term, digitalisation efforts are associated with a negative impact on performance, due to increased costs and the need for intensive resource allocation. However, when combined with high levels of globalisation, digitalisation makes a positive contribution to profitability, mitigating its initial adverse effects.

As regards intangible assets, which include patents, trademarks, copyright and capitalised research and development expenditure, there is also a negative impact in the short term. This result is explained by the uncertainty and risk associated with this type of investment, which are often undervalued by the markets.

In summary, the study concludes that, although digitalisation and intangible assets may penalise performance in the short term, globalisation plays a crucial role in enhancing company value, especially when combined with appropriate digital strategies.

**Keywords**— Competitiveness, Corporate Performance, Digitalisation, Globalisation, High-tech Companies, Intangible Assets

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# Digital Economy Modeling: The Effects of E-Commerce and ICT on Economic Growth in the EU

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**Abstract**—Digitalization and e-commerce have become key drivers of modern economic growth. The volume of online transactions has expanded rapidly, with approximately 2.3 billion digital shoppers worldwide in 2021, and global e-commerce sales reaching around USD 27 trillion by 2022. At the same time, European countries exhibit substantial variation in adoption rates. For instance, in 2023, Ireland generated about 14% of business turnover from web sales, compared to less than 5% in Italy and Slovenia. In this context, substantial investments in information and communication technologies (ICT) and the expansion of ICT employment are expected to positively influence productivity and growth as digitalization progresses across national economies. This study develops an econometric growth model to quantify the impact of e-commerce factors on GDP for Belgium, Ireland, Italy, and Slovenia. Specifically, it examines how ICT employment, ICT investment, online ordering activity, and ICT wages contribute to output. The model utilizes a Cobb-Douglas production function augmented by digital economy variables, allowing for country-specific effects and temporal dynamics. Across all four countries, digital-economy variables exhibit positive and statistically significant effects on GDP. In the Cobb-Douglas specification, a 1 percent increase in ICT employment raises GDP by 1.30–1.73% (highest in Slovenia), Internet access elasticities range from 0.23 (Italy) to 0.72% (Slovenia), and ICT investment elasticities span 0.24–1.04% (highest in Belgium). The study provides precise estimates of elasticities and marginal effects for Internet access, ICT employment, and ICT investment – evidence that can directly support policymakers in prioritizing digital transformation strategies to ensure sustainable growth.

**Keywords**— e-commerce, economic growth, Cobb–Douglas production function, econometrics, GDP, ICT employment, ICT investment

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# Dissemination of Municipal Events - The case of the City Hall of Paredes

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## Abstract

The present paper aims to understand how communication and promotion contribute to the success of events organized by municipal councils, with the chosen case study being the Paredes City Council. Nowadays, culture is seen as an essential heritage for communities, as it helps strengthen local identity, brings people together, and stimulates the economy.

Municipal authorities have therefore taken on an increasingly important role in cultural promotion, and communication is one of the only ways for them to connect with citizens.

In this study, the methods of promotion used by the Paredes City Council to publicize its events were investigated, as well as how these methods vary according to the scale of the events.

The work was developed through a theoretical review on public and cultural management and the promotion of municipal events, as well as a practical analysis of the case of Paredes.

The methodology used for the case study was qualitative, involving an analysis of data provided by the Paredes City Council. The research reveals that good municipal communication that is clear and accessible is a key factor in engaging people and plays a vital role in supporting local initiatives.

However, the study demonstrated that there are still challenges to be overcome, even though municipal communication has evolved significantly. In some cases, there is a lack of a more articulated strategic plan that establishes clear objectives and allows for the evaluation of the real impact of outreach actions. The development of an integrated cultural communication plan with clearly established objectives and a good final evaluation could make the city hall's actions even more effective and consistent.

It was evident that there is still room for the adoption of more participatory communication. It is concluded that communication is one of the main factors that, in practical terms, rivals good event organization, and it is what ensures that events become recognized and integrated into the life of the community.

**Keywords**— Municipal communication; Dissemination; Culture; Paredes

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# Driving Innovation and Digital Transformation in Vocational Education: The BT4VET Model and Toolkit

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**Abstract**— The Business Transformation for Vocational Education and Training (BT4VET) model addresses the need for vocational education and training institutions to adapt to rapidly changing socio-economic and labour market conditions. The purpose of this study is to present a structured model and a set of practical tools designed to support the strategic repositioning of vocational education providers as innovative, sustainable, and service-oriented organizations. The methodology is based on a multi-phase approach that combines institutional profiling, business model development, pilot validation, and feasibility planning. This approach integrates qualitative and quantitative analysis, stakeholder feedback, and iterative testing in real organizational contexts. The BT4VET model is operationalized through a comprehensive toolkit that includes instruments for human resource development, quality assurance, customer satisfaction assessment, marketing and promotion, project planning, performance measurement, and financial management. The principal results highlight the capacity of these tools to enhance managerial competencies, support data-driven decision-making, and foster stronger engagement with enterprises and local ecosystems. Furthermore, the model facilitates the diversification of services and reduces dependence on public funding by promoting entrepreneurial practices within vocational education institutions. The major conclusion is that the BT4VET model provides a scalable and replicable framework that strengthens institutional resilience, improves operational efficiency, and contributes to the broader goals of innovation, sustainability, and socio-economic development in vocational education and training systems.

**Keywords**— vocational education and training, business transformation, digital tools, strategic management, institutional innovation, sustainability, educational leadership

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# Emerging Technologies and Active Pedagogies in Initial Teacher Education: Preliminary Findings from a Systematic Review

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**Abstract**— Initial teacher education is under growing pressure to prepare future teachers for technology-rich classrooms and for pedagogical approaches that promote active student participation. This study presents preliminary findings from a systematic review examining how educational research addresses digital, emerging, and generative technologies in relation to the development of active pedagogies in initial teacher education. The review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol. Peer-reviewed articles published in English or Spanish between 2015 and June 2025 were retrieved from Scopus, Web of Science, and Dialnet using three search strings related to new technologies, generative artificial intelligence, and active pedagogies in initial teacher education. Eligible studies focused on pre-service teachers and teacher educators in European and Latin American contexts. After full screening, 66 articles were included. Preliminary findings indicate that literature pays considerable attention to technology integration in school settings, whereas fewer studies examine how initial teacher education programs prepare pre-service teachers to implement innovative pedagogies supported by emerging technologies. These findings point to a persistent misalignment between teacher education, emerging technologies, and active pedagogies, as technology is often approached as a technical resource rather than as a driver of pedagogical transformation. The study offers an updated overview of research trends and identifies a persistent gap in the preparation of future teachers for innovative classroom practice.

**Keywords**—initial teacher education, pre-service teachers, emerging technologies, active pedagogies, teacher preparation, systematic literature review, generative artificial intelligence

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# Empowering Graduate Employability Through AI Upskilling: A Case Study on the IPT-INCO Academy Partnership

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**Abstract**—Artificial Intelligence has become a transversal competency across all sectors, creating an urgent need for higher education graduates to acquire AI-related skills regardless of their disciplinary background. This paper presents a case study of the emerging partnership between the Polytechnic University of Tomar and INCO Academy, aimed at integrating complementary AI training into the learning pathways of final year students and recent graduates. The initiative provides self-paced, asynchronous courses of 35–40 hours, tailored to multiple application domains, including Finance, ICT, Logistics, Public Administration, and Marketing, delivered through INCO’s developing digital platform and supported by international partners such as Google.

In addition to the pedagogical and institutional components of the collaboration, the project includes the implementation of a structured pre and post-training survey aimed at capturing and evaluating how individuals subjectively perceive their own AI literacy and level of engagement. As part of this evaluation, we will integrate the Perceived Artificial Intelligence Literacy Questionnaire as the assessment survey, providing a validated and reliable method for understanding students’ perceived competencies in relation to AI. The results will help establish baseline perceptions before engagement with the INCO Academy modules and evaluate shifts in perceived literacy afterwards, supporting evidence-based insights into the effectiveness of the partnership and informing potential future adjustments to the training offer.

We analyze the expected outcomes of this collaboration, focusing on employability enhancement, alignment with micro-credentialing frameworks, and institutional benefits such as reduced administrative burden and increased strategic visibility in AI education. The study contributes to current discussions on workforce preparedness and innovative models of academia-industry cooperation for digital skills development.

**Keywords**— Artificial Intelligence, Higher Education, Employability, Digital Skills, Skills Assessment, Academia-Industry Collaboration, Upskilling

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# Empowering Independent and Critical Learning in High School Students with Learning Disabilities and ADHD: A Mixed-Methods Study on the Impact of Artificial Intelligence

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**Abstract**— This study examines the impact of Artificial Intelligence (AI) on learning processes among high school students with learning disabilities and ADHD. Using a mixed-methods design (N=105), four dimensions were examined via pre-post questionnaires and qualitative analysis: self-confidence, concentration, organization and time management, and critical thinking. Quantitatively, a slight non-significant increase in self-confidence was found, while qualitative data revealed improvements in self-efficacy, reduced anxiety, and increased autonomy in learning. Concentration showed a statistically significant decrease among younger students ( $\leq 16$ ,  $p < .05$ ), compared to stability or slight improvement among older students ( $\geq 17$ ). Organization and time management showed a moderate non-significant decrease (M: 3.11  $\rightarrow$  2.92;  $t(104) = 1.45$ ,  $p = .151$ ). Students reported that AI helped them organize information and save time, but did not improve independent planning or prioritization. Correlations were found between variables, including time management and concentration ( $r = 0.811$ ,  $p < .001$ ), time management and organization ( $r = 0.616$ ,  $p = .007$ ), and self-confidence and concentration ( $r = 0.510$ ,  $p = .031$ ). Critical thinking showed relatively low reliability in quantitative measures, while qualitative findings indicated processes such as self-checking, comparing information, and asking questions. At the same time, some students relied on AI-generated responses without critical evaluation. Differences between groups were observed: students with learning disabilities showed emotional improvement, while students without learning disabilities demonstrated relative stability. The findings suggest a contribution of AI primarily at the emotional-motivational level, particularly to self-confidence and autonomous learning, while highlighting the importance of guided and age-appropriate use in educational contexts.

**Keywords**—Artificial Intelligence, Learning Disabilities, ADHD, Self-Confidence, Critical Thinking, Autonomous Learning

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# Enabling Artificial Intelligence Transformation in Higher Education: A Qualitative Study of Institutional Best Practices for Teaching and Research Innovation

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**Abstract**—The rapid integration of generative artificial intelligence into higher education is reshaping learning, teaching, and research practices. While many institutions have introduced artificial intelligence tools at the individual level, there remains limited empirical research on how universities can strategically enable institution-wide transformation. This paper presents a qualitative study-in-progress examining a faculty fellowship initiative designed to facilitate structured artificial intelligence integration across teaching and research domains. The purpose of this study is to identify and conceptualize best practices for enabling sustainable and responsible artificial intelligence transformation within a university setting. Specifically, the research seeks to understand: (1) how differentiated training models influence artificial intelligence adoption across students, staff, and faculty; (2) how structured prompt literacy and workflow-based approaches shape teaching and research applications; and (3) what organizational conditions support or hinder scalable artificial intelligence integration. Data collection includes workshop design documentation, pre- and post-engagement surveys, participant reflections, instructional artifacts, and implementation notes gathered during a full-day institutional workshop targeting diverse stakeholder groups. Guided by digital transformation and organizational change frameworks, the study aims to develop a conceptual model outlining enabling mechanisms for artificial intelligence adoption that balance innovation, governance, and academic integrity. As a work in progress, this paper contributes to emerging scholarship on artificial intelligence transformation in higher education by proposing a structured institutional enablement framework. The findings will inform future empirical analysis and offer actionable insights for universities seeking strategically aligned artificial intelligence integration in teaching and research..

**Keywords**—Artificial intelligence in higher education; Digital transformation; Faculty development; Organizational change; Teaching innovation; Research enablement

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# ERGOCHECK: A Digital Application for Ergonomic Postural Assessment Based on Rapid Entire Body Assessment

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## Abstract

Work-related musculoskeletal disorders are a major public health concern due to their impact on functional capacity, quality of life, academic performance, and productivity. These conditions are frequently associated with inadequate posture, repetitive movements, physical overload, and insufficient recovery periods. Although several tools are available to assess technical gestures associated with the risk of musculoskeletal injuries, such as the Rapid Entire Body Assessment (REBA), important limitations remain. These include issues related to the accuracy of joint angle measurements, biomechanical artefacts, and differences between assessments conducted in laboratory settings and those performed in real-world task environments. Such limitations highlight the need to develop and validate more robust and ecologically valid methods for the assessment of human movement. In this context, this project aimed to develop ERGOCHECK, a digital application designed to improve ergonomic postural assessment by increasing objectivity, accuracy, and accessibility in risk screening.

**Methods:** The solution was developed through a mixed-methods approach guided by Design Thinking, including problem identification, ideation, prototyping, and pilot testing. ERGOCHECK captures frontal and lateral photographs, identifies 33 anatomical landmarks using artificial intelligence, calculates joint angles as a digital goniometer, and automatically computes REBA scores, risk levels, and personalized ergonomic recommendations. A pilot study conducted with higher education students enabled a preliminary evaluation of functionality, usability, and practical applicability, while also identifying aspects that require further refinement.

**Results:** The preliminary results show that ERGOCHECK is a functional and operational application capable of storing user data, while generating standardized reports with postural risk classification. Pilot testing supported the feasibility of the automated workflow usability, report clarity, and the perceived usefulness of ergonomic feedback. User feedback also informed interface refinements and improvements in the consistency of data collection and angle measurement.

**Conclusion:** ERGOCHECK shows promise as a practical, accessible, and scalable digital tool for ergonomic screening in academic and occupational settings. By reducing the subjectivity associated with manual observational assessment while preserving the strengths of the REBA method, it may contribute to more standardized postural evaluation and prevention of work-related musculoskeletal.

**Keywords**—ergonomics, postural assessment, digital health, rehabilitation, artificial intelligence, risk prevention.

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# Formative Assessment and Digital Portfolio in an Interdisciplinary Context: A Higher Education Experience

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**Abstract**—Formative and shared assessment offers students feedback on the go and promotes self-regulation. When integrated with project-based learning (PBL), portfolios can structure the formative assessment of transversal competencies and scaffold metacognitive development. However, few studies have examined how reflective portfolios operate in interdisciplinary settings, where students must navigate diverse epistemological backgrounds as they develop competencies. This article explores the role of a reflective digital portfolio as a formative assessment system in an interdisciplinary master's program at a higher education institution. We study how combining structured reflection with a digital portfolio supports self-regulation of learning and the development of personal and social competencies in PBL contexts. A qualitative case study design was adopted, involving 38 students from varied undergraduate backgrounds during the second semester of 2025. Data were collected through written reflections and self-assessments of communication and teamwork competencies and subsequently analyzed using thematic content analysis and lexicometric analysis. Results show that students identified a lack of engagement and a disconnect between theory and practice as limitations in their prior educational experiences. Lexicometric analysis confirmed the centrality of collaboration-related terms and indicated interest in the new formative experience. The portfolio-based reflective cycle supported metacognitive awareness by creating structured moments for students to connect prior experiences with emerging challenges, such as psychological safety, complementary strengths, and shared responsibility. We conclude that digital portfolios can structure self-regulatory processes in formative assessment. Future research should examine the longitudinal development of competencies and perspectives on narrative feedback.

**Keywords**— formative assessment, digital portfolio, project-based learning, interdisciplinarity, higher education, self-regulation, metacognition

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# From Mobility to Engagement: The Impact of Blended Intensive Programmes on Student Experience and Academic Involvement in Higher Education

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**Abstract**— This study examines how Blended Intensive Programmes (BIPs) influence student engagement and belonging in higher education. Grounded in Student Engagement Theory and Experiential Learning, the research conceptualises BIPs as high-impact learning experiences that integrate project-based collaboration, intercultural interaction, and real-world problem solving [1] [2]. An exploratory qualitative approach was used, based on semi-structured interviews with 15 Business Communication bachelor's students who participated in BIPs in 2025 and 2026. The data were analysed thematically to explore behavioural, emotional, and cognitive engagement, as well as students' sense of belonging and identification with their programme.

The findings indicate that participation in BIPs increased behavioural engagement through active involvement and collaborative work, strengthened emotional engagement through motivation and enjoyment, and supported cognitive engagement through reflection and application of knowledge. Emotional engagement happened to be the most relevant dimension for BIP participants [3]. Students also reported a stronger sense of belonging and a clearer identification with their academic field. These results are consistent with recent studies showing that BIPs can enhance intercultural learning, student development, and the educational value of short-term international mobility formats [4] [5]. Overall, the study suggests that BIPs should be viewed not only as mobility activities but also as strategic pedagogical initiatives that can improve student experience, motivation, and retention in higher education [1] [6]).

**Keywords**—blended intensive programs, student engagement, higher education

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# From Technology Readiness to Technical Competence: Assessing Accounting Students under the IES 2 Framework

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**Abstract — Purpose:** The digital transformation in accounting, driven by automation and artificial intelligence, has reinforced the importance of technical skills, particularly in terms of technological adaptation in the training of future professionals. In this context, this study analyses the relation between the technological readiness of higher education students and their perception of technical readiness across the 12 competency areas operationalised from the International Education Standards 2 (IES 2) of the International Federation of Accountants (IFAC).

**Method:** The research adopts a quantitative approach, based on a structured questionnaire administered to 146 students. The survey comprised three core components: sociodemographic data, self-assessment of technical readiness across the 12 IES 2 competency areas, and application of the Technology Readiness Index (TRI 2.0). Data analysis involved descriptive statistics, reliability analysis and Spearman's correlations, with the aim of examining the association between technological readiness and the perception of technical competencies.

**Main Results:** Based on the TRI 2.0 model by Parasuraman and Colby (2014), the results reveal a profile characterised by high optimism, moderate innovativeness, relatively low discomfort and high insecurity, reflecting a moderate overall level of technological readiness. At the same time, students report an overall positive perception of their technical readiness, with higher scores in financial accounting and reporting, information and communication technologies, and taxation, and lower scores in auditing. However, no statistically significant association was observed between overall technological readiness and the overall perception of technical competence. Nevertheless, a positive and significant relation was identified between overall technological readiness and competence in information and communication technologies.

**Key Conclusions:** It is concluded that technological readiness does not automatically translate into a high overall perception of technical competence, although it appears to be associated with areas more directly related to the use of technology. The results reinforce the importance of pedagogical strategies that link the development of technical skills with technological adaptation, in a professional context increasingly marked by technological demands.

**Keywords—** Technology Readiness; TRI 2.0; IES 2; Accounting Education; Technical Competencies

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# From Theory to Sales Practice: Master's Students Designing a Chatbot to Improve Seller Efficiency

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**Abstract** — The widespread incorporation of chatbots into commercial environments is reshaping sales dynamics by streamlining operations, reducing service costs, ensuring constant availability, and enabling more personalized customer interactions [1], [2]. These systems are particularly effective in addressing straightforward customer queries, offering clear and tailored responses without requiring human socioemotional involvement. As adoption expands, however, chatbots increasingly require emotional sensitivity to detect situations that should be escalated to human agents [3]. Technological evolution, from FAQ-based scripts and linear decision trees to generative AI, has significantly broadened conversational depth, adaptability, and integration possibilities across sales processes [4].

In contemporary sales environments, chatbots and conversational AI are now embedded in websites, CRM systems, and messaging platforms to automate inquiries, qualify leads, and support logistical coordination. This reflects a broader shift toward continuous, real-time engagement throughout the sales cycle. Industry reports highlight improvements in responsiveness, reduced waiting times, and enhanced customer experience [5]. Companies such as [6] further illustrate this evolution, noting that AI-powered sales assistants provide immediate insights and actionable recommendations that enhance the cognitive performance of sales professionals.

Within this context, a pedagogical initiative was implemented in the Commercial Planning and Strategy course of the Master's in Management and Commercial Direction at ISCAP-IPP. Over two academic years, slightly fewer than 60 students worked in teams to design a chatbot to support sales operations in a fictional printing company. The assignment included platform analysis, conversational flow mapping, and optional prototype development. This hands-on approach aimed to strengthen students' understanding of sales processes while fostering technological literacy aligned with current industry practices.

Qualitative feedback emphasized the novelty of the assignment, the autonomy it encouraged, and the strong collaborative work developed within teams. Academic outcomes were also notably positive: group project grades exceeded written test averages by 23 percent across both cohorts. These results suggest that integrating practical chatbot development into sales management education enhances engagement, deepens conceptual understanding, and better prepares students for technology-driven commercial environments.

**Keywords** — chatbots, sales practice, sales management, seller efficiency, artificial intelligence, frequently asked questions, pedagogical methods

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# Generative Artificial Intelligence and the Formation of Future Communication Professionals- Student Perceptions, Semiotic Mediation and Educational Challenges

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**Abstract**—The growing presence of generative artificial intelligence (GenAI) in universities is transforming how academic knowledge is accessed, interpreted, and processed by students. Students increasingly rely on AI-based systems to retrieve information, summarize large volumes of content, clarify complex concepts and support academic writing. While these tools clearly improve speed, access to information, and day-to-day study support, they also raise difficult questions about intellectual autonomy, authorship, and the cultivation of critical reasoning.

This paper explores the educational and professional implications of generative artificial intelligence for future communication specialists. The study combines a qualitative investigation of student perceptions with a narrative meta-analysis of recent academic literature on AI in higher education. The empirical part was conducted with undergraduate students enrolled in communication and engineering programs at the University of Medicine, Pharmacy, Sciences and Technology “George Emil Palade” in Târgu Mureș.

The findings show that students perceive GenAI primarily as a practical learning assistant capable of translating dense academic content into more accessible explanations. At the same moment, they express concerns regarding dependency, superficial learning and the weakening of independent analytical effort. The meta-analytical section confirms that AI can improve learning efficiency and engagement when used as a complementary educational resource, but also stresses that its pedagogical value depends on critical and ethically guided integration.

The study argues that generative artificial intelligence should be treated not as a substitute for human cognition, but as a mediated and reflexive instrument that can support, rather than replace, intellectual formation. For communication education in particular, this means preparing students not only to use AI tools effectively, but also to question them, interpret them and situate them responsibly within broader professional and cultural frameworks.

**Keywords**—generative artificial intelligence, communication education, higher education, digital literacy, AI ethics, media studies, semiotic mediation.

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# Generative Artificial Intelligence in Digital Communication Ecosystems: Educational, Psychological and Consumer Behavior Perspectives across Emerging Generations

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**Abstract**—The rapid expansion of generative artificial intelligence is transforming digital communication ecosystems and redefining how information is produced, interpreted and consumed in contemporary media environments. In algorithmically mediated platforms, artificial intelligence increasingly functions as a cognitive and communicational infrastructure that shapes learning processes, media practices and consumer behavior.

This study examines the role of artificial intelligence in convergent media environments through a transdisciplinary framework integrating three analytical perspectives: student experiences in communication, engineering and management education; psychological adaptation to algorithmically curated information environments; and the influence of artificial intelligence on consumer behavior within digital media platforms.

Methodologically, the research combines qualitative exploratory analysis with a systematic meta-analytical review of academic literature indexed in Web of Science and Scopus between 2018 and 2025. The meta-analysis follows the PRISMA protocol and examines studies addressing generative artificial intelligence, digital education, algorithmic communication and AI-driven media consumption.

The results indicate that artificial intelligence performs three interconnected roles within digital communication ecosystems: learning assistant, cognitive mediator and behavioral influencer. The analysis also highlights generational differences in media interaction, emphasizing the digital experiences of Generation Z, Generation Alpha and the emerging Generation Beta.

The study argues that educational systems must integrate artificial intelligence literacy, ethical awareness, and critical media competencies to prepare communication professionals capable of navigating increasingly artificial intelligence-mediated communication environments.

**Keywords**—Artificial intelligence, Generative Artificial Intelligence, Digital communication ecosystems, Digital education, Consumer behavior, Media literacy

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The transdisciplinary composition of the research team, combining expertise in communication studies, psychology and engineering, allows for a comprehensive analysis of artificial intelligence within contemporary digital communication ecosystems.

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# Generative Artificial Intelligence in Mathematics Education: Opportunities, Challenges, and Cognitive Implications

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## Abstract

### Introduction & Methodology

The rapid expansion of Generative Artificial Intelligence (GenAI) has intensified the debate regarding its role in mathematics education and the extent to which it may supplement or displace traditional instructional functions [4]. This paper reports a systematic literature review, conducted according to PRISMA guidelines [9], analysing peer-reviewed research published between 2023 and 2026. The study examines the educational implications of GenAI, with particular focus on mathematical reasoning, proof, and the evolving pedagogical authority of the teacher [1], [5].

### Opportunities and Pedagogical Shifts

The review identifies significant opportunities associated with GenAI, such as personalized feedback, adaptive practice, and automated support for complex mathematical explanations [3], [8]. These tools can assist in lesson preparation and provide worked examples that cater to individual learner needs [1]. However, recent research indicates that these technological capabilities do not in themselves justify the substitution of the human educator [4]. Effective mathematical learning remains strictly contingent upon active cognitive engagement and the robust development of executive functions [6].

### Cognitive Implications and Applied Quantitative Fields

Particular attention is given to the cognitive implications of AI-mediated learning, specifically the risk of unreflective cognitive offloading versus the potential for deepening conceptual understanding through metacognitive monitoring [2], [8]. This concern is critically relevant in applied quantitative domains, such as Management and Economics, where mathematical proficiency is foundational not only for procedural calculation but for higher-order modelling and strategic decision-making [7]. In higher education contexts, learners are expected to progress beyond basic competence towards abstraction, rigorous proof, and independent problem-solving [5].

### Conclusion

The review concludes that GenAI should be understood as an augmentative technology whose value depends on pedagogical frameworks that prioritize verification, justification, and self-regulated reasoning [2], [8]. While offering substantial support for personalization, excessive reliance on AI may reduce opportunities for students to practice essential analytical skills. Ultimately, the benefits of GenAI in mathematics education remain inseparable from the cultivation of human judgement, rigour, and intellectual responsibility.

**Keywords**— Generative artificial intelligence, mathematics education, systematic literature review, mathematical reasoning, proof, higher education, cognitive implications, management

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# Green ICT in Business Information Technology Education: A Practice-Based Approach

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**Abstract**— The rapid expansion of digital technologies has intensified the environmental footprint of the information and communication technology sector, while simultaneously positioning digital solutions as key enablers of sustainable development. This tension creates an urgent need to reconsider how future information technology professionals are educated. The purpose of this paper is to describe and critically reflect on how Green Information and Communication Technology principles are embedded into Business Information Technology education at a university of applied sciences.

The approach is descriptive and practice-based, drawing on curriculum integration experiences and structured student reflection activities conducted within existing courses. Sustainability considerations are integrated into teaching in areas such as software development, systems design and digital services as a natural part of core professional content. Key elements include lifecycle thinking, energy-efficient design choices, system longevity and responsible digital decision-making within authentic, work-life-oriented assignments.

Observations from course implementations indicate that students increasingly recognize the environmental implications of digital solutions and begin to connect sustainability with their emerging professional identity. Integrating sustainability into disciplinary teaching appears to strengthen both technical competence and ethical awareness.

The paper concludes that sustainable education in the digital era does not necessarily require large-scale curriculum reform, but rather a systematic integration of

sustainability into everyday teaching practices. These practice-based experiences provide insights for higher education institutions seeking to align digital education with environmental responsibility and long-term societal needs.

**Keywords**— Green ICT, sustainable education, higher education, professional competence, curriculum integration, sustainability awareness

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# Green ICT in Business Information Technology Education: A Practice-Based Approach

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# How Do Students Use Generative AI in Programming Courses? A Study with First-Year Students

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**Abstract** – Motivating students remains a significant challenge in education. Students face multiple obstacles throughout the learning process, and traditional teaching and learning methods have proved ineffective, resulting in high failure rates and disengagement.

In recent years, the rapid evolution of generative Artificial Intelligence (AI) tools, such as programming assistants and language models, has been transforming the educational landscape. In programming education, these tools can play a supporting role in learning, allowing students to obtain additional explanations, explore code examples, or receive problem-solving suggestions. This type of support can contribute to increasing students' confidence and encouraging greater participation in learning activities. Since 2020, advances in large-scale models and their increased accessibility have driven the adoption of AI-based systems in education, raising key pedagogical, technological, and ethical issues. For teachers, these tools offer new possibilities in preparing and adapting content, as well as in monitoring student progress, allowing, in some cases, for faster and more personalized feedback. For students, they contribute to a better understanding of concepts, clarification of code-related doubts, and support in solving exercises. However, concerns persist regarding technological dependence and the risk that students will use such tools merely for quick solutions without consolidating the underlying reasoning. The main risk lies not in the technology itself, but in how it is used, particularly when it replaces the cognitive process with a simple technical shortcut. In this context, it becomes crucial to understand how students effectively use these tools in the programming learning process and to assess their ability to formulate and refine their prompts. To this end, a survey was conducted with 99 first-year Computer Engineering students to identify patterns of AI use, understand if it is employed intensively and consciously, ascertain evidence of critical thinking, academic responsibility, and alignment with institutional ethical principles, and assess the existence of an explicit and structured pedagogical strategy. The results contribute to a deeper understanding of the role of AI in programming education and to reflection on new pedagogical approaches and practices.

**Keywords**—Generative AI, Prompt Engineering, Motivation, Survey Study, Generative Tools

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# Human-Centered Artificial Intelligence in Accounting and Management Education: A Pedagogical Proposal

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**Abstract** - The rapid expansion of artificial intelligence (AI) highlights the need to move beyond viewing it solely as a technical tool and instead adopt an approach that places human development at the centre of educational practice. This study proposes the introduction of a new discipline in the Accounting and Administration course at the Porto Institute of Accounting and Administration. The aim is to equip students with practical AI skills while strengthening their interpersonal and emotional skills, ensuring that technological progress does not undermine essential human capabilities.

A key consideration is that the impact of AI is not inherently positive; its educational value depends on how it is implemented. When used without ethical guidance, AI can encourage reliance on shortcuts that bypass meaningful learning, thereby weakening students' self-regulation and critical and reflective thinking. Existing research also indicates that excessive engagement with digital technologies can negatively affect well-being, contributing to stress, social isolation, and unhealthy behaviours associated with prolonged screen exposure. To address these risks, the proposed discipline is organised into two core components: AI in learning and human autonomy, and emotional intelligence.

The proposal is based on pedagogical principles that prioritise teaching quality and recognise ethical literacy as a fundamental characteristic of graduates. The teaching methodology is entirely practical and classroom-based, allowing students to work directly with technological tools while participating in human-centred learning activities. The results suggest that a structured and balanced pedagogical design supports the development of cognitive independence, enabling students to critically analyse the results generated by AI rather than accepting them uncritically.

**Keywords** - Artificial Intelligence in Education, Accounting and Management, Human-Centered Pedagogy, Cognitive Autonomy; Emotional Competencies

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# Impulsivity, social media addiction, and academic procrastination in higher education students: a multidimensional analysis and moderation of usage time

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**Abstract**—Excessive social media use has become a central issue in higher education students' academic lives, raising concerns about its impact on behavioral self-regulation, academic performance, and task postponement. Academic procrastination has been extensively studied in relation to problematic technology use patterns and individual traits like impulsivity. However, the underlying mechanisms of these relationships remain unsettled, particularly due to the involvement of diverse psychological domains. This study aims to analyze the relationships between social media dependence, impulsivity, and academic procrastination among university students, while examining the moderating role of time spent on social media in the link between impulsivity and academic procrastination. A quantitative approach was employed, applying a structured questionnaire to a sample of 235 higher education students. The model was tested at the construct level, allowing us to identify different effects between components of social media dependence and academic procrastination. Validated instruments assessed social media dependence, impulsivity, and academic procrastination. Data analysis used partial least squares structural equation modeling (PLS-SEM) via SmartPLS software, evaluating both the measurement and structural models simultaneously. Findings indicate that social media dependence is linked to higher academic procrastination levels, showing that poor control over these platforms negatively affects academic behavior, suggesting a differentiated pattern between their dimensions. Impulsivity also plays a key role in explaining procrastination, especially its attention dimension as the main predictor of task delay. No direct link was found between impulsivity and social media dependence, so this path was removed from the final model due to poor statistical fit. Time spent on social media acted as a selective moderator, strengthening the relationship between attention impulsivity and academic procrastination. The results advance the literature by clarifying psychological mechanisms connecting problematic social media use and individual traits to academic procrastination. Practically, efforts to reduce procrastination should prioritize building attention control and digital self-regulation skills over strategies solely focused on limiting social media time. These insights are especially relevant in higher education, characterized by high academic autonomy and exposure to highly stimulating digital environments.

**Keywords**—Social Media, Academic Procrastination, Students, Impulsivity, Social Media Addiction, Structural Equation Modeling

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# Integrated Management Model for Photovoltaic Projects: Optimizing Control - Financial, Planning and Execution

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**Abstract**—The management of photovoltaic (PV) projects is characterized by high technical and logistical complexity, coupled with resource volatility. This study addresses the critical fragmentation among planning, execution, and financial control processes, which leads to information silos, administrative burden on project managers, and delayed strategic decisions, ultimately compromising project profitability. The main objective was to develop and propose a conceptual integrated management model for the PV sector, operationalized via a prototype tool in Microsoft Excel, to effectively articulate these three dimensions. A qualitative methodology was employed, centered on a single case study within a sector company.

Data collection involved documentary analysis (10 projects) and direct observation of project managers' work. The critical literature review reveals that while robust project management frameworks (PMBOK, PRINCE2) and control methodologies (Earned Value Management - EVM) are available, their practical application and integration within the specific PV context remain underexplored, indicating a significant research gap.

The proposed model synthesizes and adapts the principles of PMBOK, EVM metrics, and Balanced Scorecard (BSC) perspectives to the sector's specificities. It is concluded that implementing this integrated model, supported by a real-time monitoring tool, significantly enhances performance visibility, deviation anticipation, and decision-making effectiveness, thereby strengthening the economic sustainability of PV companies.

Success will be evaluated through specific KPIs that reflect the effectiveness of the integration. To ensure sustainability and continuous improvement, the following feedback mechanisms will be implemented:

- Quarterly Performance Reviews
- Lessons Learned Reports
- User Satisfaction Surveys
- Technological Evolution

This research contributes an applied conceptual framework and a phased implementation plan, proposing future research lines for the empirical validation of the model in other contexts.

**Keywords**—Photovoltaic Project Management; Integrated Management; Earned Value Management (EVM); Financial Control






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# Integrating Podcasts in Higher Education Teaching: A Digital Strategy to Promote Active Learning in a Physiotherapy Course

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**Abstract—Introduction:** Digital learning tools have increasingly been integrated into higher education to support student-centered and active learning approaches. Among these tools, podcasts offer a flexible and accessible way to reinforce course content and promote autonomous learning. **Purpose of the research:** This study aimed to analyze the use of podcasts as a pedagogical strategy to support knowledge revision and consolidation in a first-year Physiotherapy course unit (Research in Physiotherapy I). **Materials and Methods:** Five podcast episodes were developed by the teaching staff throughout the semester. Each episode synthesized the main lecture topics and served as a revision resource before the assessment. After listening to each podcast, students completed a short questionnaire assessing their understanding of the content and their perception of the usefulness of the resource. **Principal results:** The study involved 140 first-year physiotherapy students from two campuses of the same higher education institution. Students reported positive perceptions regarding the use of podcasts as a resource for reviewing key concepts and preparing for assessments. Many participants indicated that the podcasts supported engagement with course content and facilitated the consolidation of methodological concepts addressed during lectures. Additionally, students reported using podcasts as a complementary tool for autonomous study. **Conclusions:** The integration of podcasts into teaching practice appears to be a promising digital strategy for supporting active learning in physiotherapy education. As a complementary resource, podcasts may reinforce theoretical content, support student engagement, and provide a flexible tool for revision, highlighting their potential as an innovative methodological approach in higher education.

**Keywords—** Podcasts; Active learning; Higher education; Physiotherapy education; Digital pedagogy; Teaching innovation.

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# Integrating Professional Software in Financial Accounting Higher Education: Academic Performance and Student Perceptions

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**Abstract**—The growing digitalization of the accounting field has made it more important to connect higher education with actual professional practices. This connection is especially crucial through the use of technology in teaching and assessment. Previous research shows the value of experiential learning [1] and the need for changes in accounting education [2]. It highlights the importance of developing practical and tech-related skills. In this context, a teaching model has been used in financial accounting courses for the bachelor’s degree in accounting and administration. This model incorporates professional management software in classroom activities and ongoing assessments. One of the three assessment components requires students to complete tasks using this software. Also, part of the teaching involves hands-on experience with the same tool. This method aims to strengthen the link between theoretical knowledge and practical application. Initial evidence points to better academic performance from students after this model was introduced. Also, earlier studies show that using accounting software helps students learn and is seen positively by students as useful preparation for their careers [3-4](Boulianne, 2014; Stainbank et al., 2023). This study uses a mixed-methods approach. It looks at trends in academic performance and gathers first-year students’ views through a questionnaire, and analyzed the historic results in the financial accounting courses. The focus is on learning outcomes, engagement, and perceived relevance to their future jobs. The findings aim to add to the discussion on innovation in accounting education by providing evidence on the effectiveness of using professional software in teaching and assessment.

**Keywords**—Accounting education; experiential learning; professional software; continuous assessment; student perceptions

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# Jigsaw in Higher Education Spanish Teaching: Development of Collaborative Skills in Tourism and Secretariat

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**Abstract**—The Jigsaw method is a type of cooperative learning technique where each student or group will work on one area of the content, then share their findings with all other classmates [1, 2]. This fosters positive interdependence (students rely on others), individual accountability (each student has ownership over their learning), and joint construction of learning (students learn together) [3, 4].

The purpose of this study is to examine how Jigsaw contributes to the development of twenty-first-century skills in the Spanish language in a higher-education program in the areas of secretariat and tourism [5]. To determine if Jigsaw positively impacted twenty-first-century skills such as communication and collaboration, leadership, conflict resolution, writing in Spanish, and transferable skills to the workplace, the researcher developed a survey that was administered at the end of the second semester.

The research methodology included an exploratory case study design and consisted of forty-eight participants. Two instruments were used to collect the data including a close-ended questionnaire and a semi-structured interview consisting of open-ended questions regarding the students' experiences, challenges encountered, and perceived usefulness for future application. The instructional approach included cooperative work with the Jigsaw model based on task division, individual accountability, and peer knowledge sharing [6, 7].

The results indicated that most of the students had a positive perception of the Jigsaw method, with the most significant strengths being in the collaborative and social-emotional aspects of the strategy. Specifically, the students reported that they found the clarity of task assignment, sense of shared responsibility, ability to resolve conflicts, and the relationship between collaborative work and internship settings/and/or future workplaces as the most positive aspects of the Jigsaw method [8, 9]. However, the perceived increases in writing in Spanish, technical vocabulary, and grammatical accuracy were somewhat lower than those identified by the students for the collaborative/social-emotional skills. The study concludes that the Jigsaw method may be a useful teaching strategy in higher-education programs that include applied languages due to its potential to promote collaboration, adaptability, sense of responsibility, and application of classroom concepts to real-world situations [10]. Nevertheless, additional pedagogical strategies need to be developed to enhance the technical writing skills of students who are instructed using the Jigsaw method.

**Keywords**—Jigsaw; cooperative learning, Spanish as a Foreign Language, higher education, transversal skills, collaboration, employability.

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# Leadership as a Driver of Digital Innovation in Higher Education: A Conceptual Mapping of Emerging Dimensions

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**Abstract**— Digital Transformation (DT) has reshaped the landscape of higher education, demanding new forms of leadership capable of guiding institutions through technological, pedagogical, and organizational change. This study examines how scientific literature conceptualizes the relationship between leadership and DT within higher education, with a particular focus on how these dynamics influence innovation in teaching, learning, and institutional development.

The research follows a bibliometric review of scientific publications indexed in Scopus between January 2020 and December 2024, applying the PRISMA protocol to ensure transparency and methodological rigor. After screening and eligibility procedures, the selected corpus was analyzed through factorial mapping of co-occurring terms, enabling the identification of conceptual clusters and emerging knowledge structures.

The analysis reveals three interconnected dimensions that shape current understandings of digital innovation in academic contexts. The educational and institutional digital dimension highlights the growing relevance of digital curricula, hybrid learning environments, and the development of digital competencies among educators and future leaders. This dimension underscores how higher education institutions have become laboratories for digital innovation, particularly accelerated by the pandemic context.

The technological and operational dimension reflects the integration of emerging digital technologies, information systems, and innovation processes that support new models of educational delivery. These operational foundations create the conditions under which pedagogical innovation becomes viable.

The strategic and organizational dimension emphasizes the pivotal role of leadership in aligning institutional vision, culture, and sustainability goals with digital transformation initiatives. Leadership emerges not merely as a facilitator of technology adoption, but as a strategic actor shaping value-driven and future-oriented educational models.

Overall, the findings offer a conceptual map that positions leadership as a key driver of digital innovation in higher education, contributing to the design of sustainable, learner-centered, and technologically enhanced educational ecosystems.

**Keywords**— Digital Transformation, Leadership, Higher Education, Digital Innovation, Bibliometric Analysis, Hybrid Learning, Digital Competencies

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# Making STEAM Tangible: The Rural Makerspace Initiative “Technik für Kinder Vulkanland” in Austria

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**Abstract**—Access to education in science, technology, engineering, arts and mathematics (STEAM) remains unevenly distributed, particularly in rural regions where opportunities for hands-on technical learning are often limited. At the same time, many children and adolescents hold outdated perceptions of technical and craft-related professions, which can influence their educational choices and reduce interest in technical careers. Innovative educational approaches are therefore needed to connect traditional skills, digital technologies and real-world problem solving in ways that make STEAM learning accessible and engaging.

This paper presents the initiative Technik für Kinder Vulkanland, a rural makerspace located in the Styrian region of southeastern Austria. The initiative provides a professionally equipped workshop where children and adolescents aged 7 to 15 can explore technical and craft skills through hands-on activities. The workshop includes multiple workstations with tools and materials as well as access to machines and digital components such as sensors, light-emitting diodes (LEDs) and simple automation elements. By combining traditional craftsmanship with modern technologies, the makerspace creates learning experiences that connect manual skills with contemporary technological developments.

The paper focuses on the conceptual design of the workshop and the educational programs developed for this environment. Activities are structured around project-based and exploratory learning formats that encourage participants to design and build their own objects and prototypes. Programs are designed to gradually introduce technical concepts while maintaining a strong emphasis on creativity, experimentation and collaborative problem solving.

A distinctive feature of the initiative is its intergenerational mentoring approach. Many mentors are experienced craftspeople or technicians who guide participants in developing their projects and share practical insights from their professional backgrounds. This mentoring model connects local knowledge with informal learning and strengthens links between young people, regional industries and technical professions.

By presenting the structure and educational principles of this rural makerspace initiative, the paper aims to illustrate how community-based learning environments can make STEAM education more tangible and accessible. The initiative also seeks to challenge gender stereotypes in technical fields and actively encourages the participation of girls. The concept demonstrates how makerspaces can contribute to sustainable education by linking traditional craftsmanship, digital technologies and future-oriented skills.

**Keywords**—makerspaces, project-based learning, rural innovation, informal learning environments

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of the mentors, whose engagement constitutes the foundation of the project’s intergenerational learning model.

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# Mathematical Modelling and Optimisation in Sustainability Education Using the Horton Equation

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**Abstract**— Understanding and accurately modelling water infiltration in soil is essential for many environmental and agricultural applications, including efficient irrigation management and soil characterisation. One of the classical models used to describe the temporal behaviour of soil infiltration is the Horton equation. Although widely used due to its simplicity and its capacity to represent the infiltration process, some of its parameters are difficult to estimate directly from field observations because they depend on soil properties. Consequently, parameter estimation becomes a key challenge when applying the Horton model to real data.

This work focuses on estimating the parameters of the Horton equation using experimental data and numerical optimisation techniques. The study was developed within the context of a pedagogical activity in which students explored how mathematical modelling and optimisation methods can be combined to calibrate models based on real measurements. The process began with the collection of experimental data describing the infiltration of water into the soil, providing the empirical basis required for model calibration.

After data collection, a mathematical model based on the Horton equation was used to represent the infiltration behaviour over time. As the model contains parameters that cannot be measured directly, the calibration task was formulated as a nonlinear optimisation problem. The objective was to determine the parameter values that minimise the discrepancy between the model predictions and the observed experimental data. To achieve this, different numerical optimisation methods were implemented and analysed, allowing their performance in estimating the parameters to be compared.

The results enabled students to identify the set of parameters that provides the best fit between the Horton model and the experimental data. Furthermore, comparing the different optimisation methods made it possible to evaluate their performance.

Beyond the mathematical results, this work highlights the value of interdisciplinary approaches in education. The activity integrates concepts from mathematics, computing, hydrology, and environmental sciences, helping students understand how quantitative tools can be applied to real-world problems related to sustainable water management. The activity supports education for sustainability by encouraging critical thinking about the responsible use of natural resources and the role of mathematics in addressing current environmental challenges.

**Keywords**—Optimization, Infiltration, Horton Equation, Interdisciplinarity, Sustainable Education

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# Negotiating Concepts and Terms with the Machine: AI, Translation Technologies, and the Learning of Portuguese as a Global Language

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**Abstract**— This presentation examines the case of Erasmus students at ISCAP enrolled in Portuguese as a Foreign Language (PFL) courses (levels A1 and A2), focusing on the experimental integration of artificial intelligence (AI) and machine translation (MT) within a language learning framework. Grounded in principles from terminology studies—particularly the relationship between terms, concepts, and knowledge organization—the study explores how learners engage with domain-specific vocabulary and conceptual structures through technologically mediated environments. Drawing on data collected through classroom observation, student presentations, and qualitative analysis, the research investigates how AI and MT tools influence the development of terminological competence, understood as the ability to identify, interpret, and appropriately use terms within specific conceptual systems. Special attention is given to processes of term variation, conceptual negotiation, and the representation of knowledge across languages. The study addresses two central questions: how does the integration of AI and MT reshape learners’ access to and construction of conceptual knowledge in a semi-guided learning context, and how do these tools contribute to students’ understanding of Portuguese as a global language embedded in diverse communicative and cultural domains? Findings suggest that while AI and MT facilitate access to language resources and support the recognition of conceptual relations, they also introduce challenges related to ambiguity, inconsistency, and decontextualized term usage. These limitations highlight the crucial role of human mediation—particularly that of educators—in guiding learners through processes of conceptual clarification, validation, and contextualization. The study ultimately argues for a concept-oriented approach to the integration of emerging technologies in language education, emphasizing that effective learning depends not only on access to linguistic data, but on the structured understanding of the conceptual systems they represent. In this context, terminology serves as a critical interface between language, knowledge, and technology, reinforcing the enduring relevance of human expertise in AI-enhanced learning environments.

**Keywords**— Portuguese as a Foreign Language; Machine Translation; Terminology; Concept; Term

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# Pecha Kucha in Higher Education Spanish Teaching: Oral Communication and Professional Skills in Secretariat and Tourism

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**Abstract**— The concept of Pecha Kucha has its roots in Japan as a presentation technique in which speakers use twenty images to illustrate their ideas, with only twenty seconds allocated to each slide [1]. Therefore, it is a method for the rapid dissemination of ideas and promotes effective communication and audience participation through the integration of visual and audio elements at a fixed rate [2, 3].

Moreover, the Pecha Kucha methodology lends itself well to developing students' ability to communicate effectively in spoken Spanish within higher education programmes in the areas of Secretariat and Tourism [4]. The aim of this study was to examine whether students perceived Pecha Kucha as a valuable tool for improving their spoken communication skills in Spanish, including their ability to synthesize information, select appropriate visual support, manage time and apply the knowledge gained to real-world professional contexts [5].

This study adopted a single exploratory case study design with a sample of forty-eight (48) students. Data were collected after the second semester through two instruments: a closed-item survey used to gather quantitative data and semi-structured interviews with open-ended questions designed to explore learning experiences, perceived difficulties and possible future applications of the Pecha Kucha method.

Students were required to prepare and deliver short oral presentations in Spanish using the 20 × 20 format. This structure enabled them to practise concise communication, integrate visual and auditory elements into their presentations and maintain a consistent pace of speech while presenting [6, 7].

Overall, the results indicated a very positive perception among students regarding the capacity of Pecha Kucha to improve their spoken Spanish skills. Students also reported improvements in their ability to synthesize information, respect the presentation time limits, organize visual aids effectively and demonstrate critical thinking during their presentations [8, 9].

Many participants also recognised the applicability of the Pecha Kucha method to their future careers in Secretariat and Tourism, identifying workplace situations such as meetings and communication with different audiences. However, some students reported difficulties in maintaining continuous speech and expressed concerns about their self-confidence when speaking publicly.

The findings suggest that Pecha Kucha represents a distinctive and multidimensional approach to teaching and learning that can support the development of communication,

conciseness and employability skills in higher education programmes focused on applied language studies [10].

**Keywords**— Pecha Kucha, Spanish as a Foreign Language, oral communication, higher education, Secretariat and Tourism, multimodal presentation, employability skills.

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# Positioning the Open Educational Smart Campus (OESC): A comparative analysis of open educational platforms

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*Abstract* Open education has emerged as a key approach to promoting learning opportunities and supporting lifelong learning for all [1,2]. In line with global policy agendas, such as Sustainable Development Goal 4 (quality education), the open availability of educational resources has become increasingly important [3]. However, effective implementation depends not only on the availability of Open Educational Resources (OER) but also on digital platforms capable of organizing, curating, and delivering them [4]. Within this context, this study presents a comparative analysis of open educational platforms, with the dual aim of positioning the Open Educational Smart Campus (OESC) [5] within the current landscape of digital open education and informing its future redesign. The OESC is an open digital space accessible to the wider community, where OERs are available and can be annotated by users, reinforcing collaborative knowledge practices. These OERs are shared respecting the FAIR principles: findability, accessibility, interoperability, and reusability. OESC also features an e-learning space, supporting the development of accessible courses for diverse audiences and fostering the sustainability of educational research and pedagogical practices [6]. The analysis is grounded in the Cape Town Open Education Declaration principles [7], which conceive open education as extending beyond OER to encompass open technologies that facilitate collaborative and flexible learning, the open sharing of teaching practices, and new approaches to assessment, accreditation, and collaborative learning. Platforms were selected based on the following criteria: i) online open access availability; ii) provision of OER, preferably under open licenses; and iii) support for user collaboration, such as comments, feedback, or co-authorship. Where present, the integration of artificial intelligence features was also considered. The resulting sample comprises six platforms, a deliberately small sample suited to a qualitative comparative design, enabling a more in-depth examination of each platform's characteristics and functionalities, rather than statistical generalisation. The outcome of this study is the development of a comparative analysis framework for educational platforms, intended both to analyse existing platforms and to guide the design of digital environments aligned with open education principles. Furthermore, the study examines the potentialities and constraints of the OESC, positioning it within the broader ecosystem of open educational platforms and informing the platform's future redesign, supporting improvement of its features and capacity to foster open education practices, potentially enhanced through the integration of AI-driven functionalities.

## Keywords

open education, OER, comparative study, artificial intelligence

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# Project-Based Innovation Education Through University-Industry Collaboration: A Course Design and Learning Outcomes Analysis

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**Abstract**— This study examines a student-centered innovation course implemented through collaboration between Aydın Adnan Menderes University (Faculty of Economics and Administrative Sciences, Nazilli), the University's Project and R&D Coordination Office, and the Nazilli Chamber of Commerce. The course, titled *UTIF303 Innovation Management*, has been conducted for three consecutive years and integrates theoretical instruction with applied project-based learning. The main purpose of this research is to analyze the instructional design, implementation process, and learning outcomes of the course and to evaluate its contribution to students' innovation competencies within the framework of sustainable education.

The study adopts a mixed-method case study design. Empirical data were collected through rubric-based project evaluations and learning outcome assessments. Quantitative data consist of scores assigned to project reports, posters, prototypes, and oral presentations using standardized evaluation rubrics. Qualitative data were obtained through instructor observations and process-based evaluation of student performance. Following theoretical instruction, students develop innovation projects under faculty supervision. Each project produces three outputs: a written project report, a project poster, and a prototype. Projects that pass preliminary evaluation are presented at a public "Project Market" event attended by local administrators, business representatives, academics, media, and community members. The most recent implementation, held on January 20, 2026, included 45 student projects, of which 13 received awards. The findings suggest that integrating project-based learning with university-industry collaboration provides an effective model for sustainable innovation education.

**Keywords**— Innovation education, project-based learning, university-industry collaboration, student-centered learning, higher education

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# Promoting Mathematics Learning Through an Interdisciplinary STEAM Approach

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**Abstract** - Contemporary scientific and technological developments demand a paradigm shift in education, calling for methodologies that prepare students with the skills necessary to face the challenges of a globalized society. This research examines how an interdisciplinary approach grounded in the STEAM model (Science, Technology, Engineering, Arts, and Mathematics) can enhance the learning of Mathematics in the third cycle of basic education. The study sought to position Mathematics as a structural axis within a practical and contextualized framework, responding to students' frequent questioning about the real-world usefulness of abstract mathematical concepts. Additionally, the project aimed to promote collaborative work, strengthen spatial reasoning and computational thinking, and foster creativity through the integration of multiple disciplinary areas.

The methodology followed a case-study design involving two seventh-grade classes. The project, entitled "*From Geometry to Poetry: a journey of Art, Sound, and Mathematics in the creation of 3D Birdhouses*," integrated Mathematics, Information and Communication Technologies, Portuguese, Music, and Visual Arts. In Mathematics, students used dynamic geometry software to plan geometric figures and calculate areas and angles. In Information and Communication Technologies, they transferred these plans to 3D modeling tools for subsequent printing. Parallel activities included creative writing, digital sound manipulation, and the construction of an artistic exhibition tree. Assessment was formative, supported by specific rubrics and continuous feedback addressing both the creative process and the final technical product.

The results show a clear increase in student motivation and engagement, with learners recognizing the role of Mathematics in practical and creative contexts. Although most students demonstrated competence in digital modeling tools, some difficulties emerged in the manual application of area formulas, highlighting the need to teach students to analytically validate software-generated results. For teachers, the experience represented a positive step toward pedagogical innovation, though logistical challenges—such as the lack of aligned schedules for collaborative planning—were identified.

In conclusion, the integrated STEAM approach proved effective in fostering meaningful learning and developing essential social and interpersonal skills for the twenty-first century, aligning with students' interests and deepening their understanding of Mathematics.

**Keywords** - Interdisciplinary Learning, Mathematics Teaching, Pedagogical Innovation, STEAM Education.

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# Scaffold or shortcut? Integrating AI into the English Language Classroom

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**Abstract**—As Artificial Intelligence (AI) tools and agents become ubiquitous in all aspects of our personal and professional lives, this inevitably brings about profound changes in teaching methodologies and student assessment in Higher Education Institutions (HEI), impacting learning workflows. In this context, banning Large Language Models (LLM) such as ChatGPT, Gemini and Claude, is both impractical and counterproductive, potentially leaving students underprepared for a technologically mediated world. This challenge is particularly clear in language education, where Large Language Models (LLM) directly engage with the core object of study – language itself. Therefore, it is paramount we explore how AI can be meaningfully integrated into language learning environments while promoting ethical awareness, cognitive engagement, as well as effective learning outcomes. In this survey-based study, English language learners from two different bachelor's programs at ISCAP - International Trade and Administrative Assistance and Translation - are presented with two argumentative writing tasks on course-related topics: one completed using ChatGPT support and another without it. Following task completion, participants fill out a survey and provide structured feedback on their experiences, perceived learning outcomes, ethical considerations, and levels of motivation. To examine the relationship between student perceptions and actual performance, survey results are measured against the quality of the writing assessed through double marking in line with specific criteria: task achievement; organization and coherence; language use; critical thinking; originality. The findings aim to contribute to ongoing debates on the role of AI in higher education, particularly in language learning contexts, by informing more balanced and effective integration strategies.

**Keywords**—Artificial intelligence, second language learning, digital assessment; teaching methodologies

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# Servant Leadership and Quality Culture in Higher Education Institutions

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**Abstract**— Contemporary higher education institutions operate in an environment shaped by internationalisation, increased accountability, stakeholder expectations, and continuous quality enhancement requirements. In such a context, leadership approaches that foster trust, participation, and shared responsibility are becoming increasingly important. This paper examines the potential of servant leadership as a framework for strengthening quality culture in higher education institutions.

The purpose of this conceptual study is to analyse how leadership practices oriented toward service, empowerment, ethical responsibility, and stakeholder engagement can contribute to the development of a sustainable quality culture. The study is based on a structured review and synthesis of literature in the fields of servant leadership, academic leadership, and quality management in higher education. Through conceptual analysis, the paper develops an integrative framework linking servant leadership principles with core dimensions of quality culture, including shared values, collaborative governance, continuous improvement, and institutional learning.

The findings suggest that servant leadership can create conditions conducive to the development of participatory and trust-based academic environments in which faculty members, administrative staff, students, and external stakeholders actively contribute to quality enhancement processes. By aligning leadership practices with institutional mission and collective values, servant leadership may strengthen institutional coherence, academic autonomy, and long-term organisational effectiveness. The paper concludes that servant leadership represents a relevant and promising approach for higher education institutions seeking to embed quality as a shared organisational culture.

**Keywords**—Servant Leadership; Quality Culture; Higher Education Institutions; Stakeholder Engagement; Academic Leadership

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# Simulation-Based Learning in Accounting Education: Developing Professional Competencies in an AI-Conscious Pedagogical Framework

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**Abstract**— This paper outlines the pedagogical model that shapes the Business Simulation Project (BSP) I and II, two integrative course units delivered in the third year of the Bachelor's Degree in Accounting and Administration at Porto Accounting and Business School. Designed to bridge academic learning with the practical demands of the labour market, these units place students at the centre of a fully simulated business environment, fostering the acquisition of technical, ethical, and professional competencies required in contemporary accounting practice. Grounded in Problem-Based Learning and practice-driven simulation, the BSP units rely on laboratory settings where students manage a virtual company throughout its complete operational cycle. Using Enterprise Resource Planning software, electronic banking tools, and tax authority simulators, students perform tasks that mirror real organisational processes, including legal incorporation, initial accounting records, inventory and capital management, payroll processing, more complex financial operations, and full compliance with tax obligations. Through these activities, learners gain increasing autonomy in preparing financial statements, producing management reports, and meeting statutory deadlines, capabilities that reinforce their readiness for professional practice and for the Certified Accountants Association admission. The role of Artificial Intelligence (AI) within these course units. Although the ERP system employed already incorporates automated and semi-automated functionalities, the introduction of AI-powered tools into the learning process has been intentionally postponed. This decision reflects a pedagogical commitment to safeguarding the development of core technical and transversal competencies, particularly critical reasoning, professional judgement, and analytical decision-making. While AI has the capacity to streamline tasks traditionally performed by accountants, its premature integration risks diminishing students' engagement with foundational accounting processes that these units are designed to strengthen. As such, the incorporation of AI is being carefully assessed to ensure alignment with the intended learning outcomes and the broader professional expectations of the accounting field. Overall, the immersive pedagogical approach adopted in these courses cultivates a holistic understanding of business management and promotes the integration of knowledge across functional domains. By combining simulation, active learning, and professional authenticity, these courses ensure that future accountants graduate with the technical proficiency, technological adaptability, and ethical awareness required in a rapidly evolving professional landscape.

**Keywords**— Business Simulation; Accounting Education; Problem-Based Learning; Critical Reasoning; Artificial Intelligence in Education; Experiential Learning

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# Social emotional skills and gender stereotypes

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**Abstract**— Social and emotional competencies are a fundamental aspect of human development and an increasingly recognised factor in contemporary educational processes. These competencies significantly contribute to academic success, psychological well-being, social participation and the capacity to navigate an ever-changing job market. Their dynamic and malleable nature also makes them particularly responsive to educational interventions, especially in the early stages of schooling.

In this context, an analysis of the social-emotional skills of students around the age of eleven, inspired by the Big Five theoretical model and the OECD-SSES framework, examined nine dimensions: curiosity, creativity, persistence, responsibility, sociability, assertiveness, empathy, resilience to stress, and optimism. These competencies were measured alongside information on students' cognitive abilities and socioeconomic backgrounds to better understand the relationships among personal development, family context, and educational outcomes.

The results revealed notable differences related to gender, region, and socioeconomic status. On average, girls demonstrate higher levels of responsibility and empathy, whereas boys tend to score higher in assertiveness, sociability, and stress resilience. Analysis of gender stereotypes also indicates that such representations are present and established by the age of eleven, with a higher prevalence among boys. This is particularly relevant as it can influence perceptions of social roles and guide future educational choices.

From a regional perspective, a distinctive pattern emerges: while Southern Italy traditionally records weaker cognitive learning outcomes, it shows higher average levels of certain socio-emotional skills. This 'reversed geography' suggests the presence of socio-emotional capital that does not always align with traditional maps of educational inequalities.

**Keywords** — social-emotional skills; gender stereotypes; gender differences; regional inequalities; social-emotional development.

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# Students as Creators: Learning Mathematics with ASYMPTOTE

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**Abstract**—Digital technologies have significantly influenced engineering education in recent years. Learning management systems, such as Moodle, have enabled the development of more flexible and interactive learning environments, allowing students greater control over their learning through personalised pathways, through immediate feedback and through interactive resources. However, despite the availability of these technologies, digital tools are often underused and their integration into traditional curricula remains fragmented. Consequently, there is an increasing need for digital platforms that combine content delivery with real-time assessment in ways that are engaging and adapted to students' learning needs. In higher education mathematics, adaptive digital platforms have been explored as a way to support students in introductory calculus courses, that are often challenging for engineering students. One such platform is ASYMPTOTE, an adaptive digital learning environment that supports mathematics education through dynamic task generation, real-time feedback and the organization of activities through learning graphs representing relationships between mathematical concepts. Within this framework, the work presented focuses on the creation of student-generated mathematical tasks in a first-year Mathematical Analysis course. Working in small groups, students design tasks related to the topics addressed in the course. These tasks are subsequently reviewed and integrated into the ASYMPTOTE platform, where they become part of the digital learning environment and are organized through learning graphs. By engaging students in the creation of learning materials that are later used by their peers, this approach promotes active participation, collaborative learning and deeper conceptual understanding of mathematical concepts.

**Keywords**—adaptive learning, digital learning platforms, mathematics education, student-generated tasks, learning graphs, ASYMPTOTE, engineering education

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# Thayer-inspired teaching routines as active learning in higher business education

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**Abstract** -This paper reports an embedded case study of a Thayer-inspired teaching routine (M1–M2–M3) implemented across four business curricular units (covering global competitiveness, strategic marketing, international marketing, and B2B marketing) during the 2025–2026 academic year. The routine operationalises (M1) a 10–20 minutes conceptual framing with explicit learning outcomes; (M2) small-group ( $\leq 3$  students) applied problem work using permitted digital tools (including AI under disclosure and verification rules); and (M3) an unsupported oral defence (no slides, notes, or devices), with mandatory individual contribution and structured questioning. Drawing on evidence on active learning effectiveness and constructive alignment, the M1–M2–M3 routine is conceptualised as integrity-by-design: students may use tools to learn and build artefacts (M2), while their individual understanding and reasoning are authenticated through a technology-free defence (M3). Across the four embedded units of analysis, findings report a trajectory from initial student discomfort and insufficient preparation to progressively stronger conceptual accuracy and argumentation. The paper documents the positive learning outcomes achieved and the structural challenges encountered (including anxiety, overload, and unequal academic capital) and discusses their implications for assessment design in AI-normalised environments.

**Keywords** - Thayer method; active learning; constructive alignment; authentic assessment; oral defence; academic integrity; generative AI; assessment equity

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# The “Advance Button” Model: Teaching Technological Paradigm Shifts in the Creative Industries

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**Abstract**— Understanding technological change is a central challenge in education for the creative industries. Students often encounter rapid transformations in media technologies but lack conceptual frameworks for analyzing how these shifts occur. This paper presents the “Advance Button” model as a pedagogical framework for teaching technological paradigm shifts in digital media and creative industries programs.

The model is based on the observation that major industry transformations frequently occur when a small technological affordance enables users to bypass existing constraints and adopt new practices at scale. The concept originates from the example of advertisement-skipping technology in digital video recorders, where the introduction of a simple thirty-second advance function allowed viewers to bypass television commercials easily, exposing the vulnerability of an advertising-dependent broadcast model. Similar dynamics can be observed in peer-to-peer music sharing, simplified online video platforms, digital reading devices, and innovations in music performance technologies.

In classroom settings, the Advance Button framework is used to analyze these cases through comparative discussion and project-based learning. Students identify four stages of technological transformation: technological accumulation, enabling affordance, behavioral cascade, and paradigm shift. Applying this framework allows students to explore how technological innovation reshapes creative production, distribution, and cultural markets.

The results from classroom implementation suggest that this model improves students’ ability to understand technological disruption, supports interdisciplinary learning between arts and technology, and provides a practical framework for analyzing innovation in the creative industries.

**Keywords**— Technological Paradigm Shifts; Digital Media Education; Creative Industries; Technological Disruption; Pedagogical Frameworks

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# The flipped classroom in higher education: pedagogical innovation in a master's degree module

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**Abstract**— The introduction of the flipped classroom methodology stemmed from recurring difficulties identified by students, particularly in the theoretical component, where lessons were predominantly lecture-based, resulting in low student participation and a lack of motivation.

The proposal focused on the systematic adoption of the flipped classroom methodology, combined with peer-to-peer learning, to explore theoretical content and research practical case studies. In groups of three, students investigated topics guided by the teacher, produced summaries in digital formats (e.g., PowerPoint/Canva) and delivered oral presentations that took on the role of a 'lesson', complemented by learning assessment activities (e.g., quizzes) and a final discussion/reflection.

The observed results point to greater participation and motivation, evidence of knowledge acquisition and improved academic performance. Among the challenges, the following stand out: initial resistance from some students, the management of collaborative work in classes with international students, the need to redefine the teacher's role as a facilitator, and the misuse of AI (mitigated by requiring references). It is concluded that the flipped classroom, integrated with active strategies, contributes to more participatory, applied and meaningful learning in this course unit, justifying the continuation and refinement of the model.

**Keywords**— pedagogical innovation; flipped classroom; peer instruction; higher education

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# The Impact of Environmental, Social and Governance (ESG) on Corporate Resilience in Uncertain Economic Contexts

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**Abstract**— The study aims to analyse the potential impact of sustainability performance, as measured by Environmental, Social and Governance (ESG) criteria, on business resilience in times of crisis. Recently, sustainability issues have taken on a pivotal role in organisational management, driven by growing pressure from stakeholders and the need to adapt to economic environments characterised by uncertainty. In this regard, the study seeks to highlight the possible relationship between companies that demonstrate best sustainable practices and greater resilience and recovery capacity during adverse periods.

The research adopts a quantitative approach, based on a sample of 588 listed European companies, covering the period between 2004 and 2023. Fixed-effects econometric models were used to analyse the relationship between Environmental, Social and Governance (ESG) performance, corporate investment and contextual variables, such as periods of crisis, with financial performance, measured alternately through ROA (Return on Assets) and market value.

The results show that the aggregate Environmental, Social and Governance (ESG) score has a positive and statistically significant impact on both accounting performance and market performance, suggesting that sustainability acts as a key strategic factor, helping to strengthen corporate resilience.

In the individual analysis of the three pillars of sustainability, the social factor stood out in terms of accounting performance, whilst all three pillars (environmental, social and governance) had a positive impact on market valuation. Investment was also found to contribute positively to companies' competitiveness and adaptability.

On the other hand, variables associated with periods of crisis revealed mostly negative effects, although with differences depending on the performance indicator analysed.

In conclusion, the study contributes to the literature by demonstrating that the integration of sustainable practices can strengthen business resilience, being relevant for the definition of organisational strategies and for future research on sustainability and financial performance.

**Keywords**— Sustainability, ESG, Business Resilience, Financial Performance, Fixed Effects

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# The Impact of Supplementary Mathematics Training and Digital Resources on Student Performance

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**Abstract**— This study presents the design, implementation, and impact of three complementary training courses: **Matemática 4U**, **Matemática 4U2**, and **Financial Mathematics**, developed to support students in strengthening their mathematical skills. The courses were delivered through face-to-face sessions and supported by a set of specially designed digital learning materials, including instructional videos, quizzes, interactive forms, and exercise worksheets. All supporting resources were made available through the online platform **MatActiva**, to extend learning beyond the classroom and promote autonomous study.

The pedagogical model combined in-person instruction with structured online resources, enabling students to review concepts, practice problem-solving, and assess their progress independently. To evaluate the effectiveness of the initiative, the academic performance of students who attended the courses was compared with that of students who did not participate.

The results indicate a significantly higher level of achievement among students enrolled in the training courses. Participants demonstrated improved understanding of mathematical concepts and achieved markedly better academic outcomes than their peers who did not attend the courses. These findings highlight the positive impact of combining targeted in-person training with well-designed digital learning resources.

Overall, the study suggests that structured support programs integrating classroom teaching and online platforms such as **MatActiva** can play a key role in enhancing students' mathematical competencies and academic success.

**Keywords**—Blended Learning Environments, Digital Educational Resources, Student Academic Performance, Higher Education, **MatActiva Online Project**.

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# The importance of assessing digital skills in secondary schools

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**Abstract—** Digital competence is now an essential prerequisite for lifelong learning, social participation and active citizenship. This paper presents a national assessment model developed to evaluate the digital skills of second-year secondary school students. Based on the European Framework for Citizens' Digital Competences, the model focuses on four main areas: information and data literacy; online communication and collaboration; digital content creation; and safety and responsible use of digital environments.

The development of the assessment tool involved the creation of an item bank calibrated using established psychometric methodologies, as well as adopting a vertical scale that allows comparisons to be made over time between school cohorts. Proficiency levels were established through structured standard-setting procedures that distinguish three thresholds: basic, intermediate and advanced.

The results show that most students reach at least an intermediate level of proficiency across all domains. They demonstrate particular strength in information management and face greater challenges in digital safety, particularly regarding data protection and the management of online interactions. Furthermore, regional and socioeconomic disparities emerge, reflecting inequalities in learning opportunities and technological access.

Correlational analyses reveal positive and significant associations between digital skills and performance in standardized Italian and Mathematics tests. These correlations, ranging from approximately 0.35 to 0.58, suggest that higher levels of digital proficiency are associated with improved reading comprehension and more effective handling of numerical information. Level distribution confirms this trend: students with advanced digital skills are more frequently found in the advanced levels of subject tests, while those with basic digital skills tend to be concentrated in the lowest performance brackets.

Overall, the results suggest that digital competence is a cross-cutting dimension that supports fundamental learning. These findings provide useful insights for educational planning aimed at reducing regional and social disparities.

**Keywords —** digital competence; assessment; secondary education; information literacy; digital safety; learning outcomes; equity in education

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# The student's role in self-empowerment

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**Abstract** — Education is a vast subject, ruled by specific and different studies, focused on society's evolution. In fact, repeating the same pedagogies, methodologies, strategies, and assessment methods for decades is not successful, because it promotes a great disconnection between students and learning desire, focus, engagement and resilience. In this sense, it is crucial to capture the student's attention, involve them in the learning process, and build a learning path with them so that they feel valued, confident, and resilient, imbued with a spirit of cooperation, sharing, articulation, and consolidation of knowledge, overcoming the easiest path: giving up. In 2019, Agrupamento de Escolas de Oliveira do Bairro (AEOB) faced the challenge of implementing an Innovation Plan (IP), over portuguese legislation and supervised by the Curriculum Autonomy and Flexibility team of the Ministry of Education, acting as mediator in the IP implementation process. In this program, AEOB adopted a cross-curriculum strategy with a methodology based on direct observation of students throughout the learning process and included representatives of parents/guardians in monitoring meetings, thus adopting a methodological shift. The IP implementation at AEOB constitutes a process of change, characterized by two completed periods of three academic years and the beginning of the third period in 2025. This is a path of inclusion, innovation, growth, new ideas, new considerations and new directions, consolidating the most positive achievements and, with a resilient attitude, questioning and implementing new pedagogies, methodologies and strategies.

**Keywords**—cross-curriculum, innovation, interdisciplinarity, project-based learning, guidelines, workshops, success

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# Theoretical Foundations of Artificial Intelligence-enabled Project Management: A Systematic Literature Review

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**Abstract** — Artificial intelligence (AI) is recognised as an important technological driver of ongoing digital transformation in contemporary organisations. In the field of project management, recent literature increasingly highlights that AI is transforming project management practices and processes. However, despite the growing number of studies, the theoretical foundations of AI-enabled project management research remain fragmented and insufficiently synthesised. Without clear theoretical grounding, research on AI-enabled project management remains largely descriptive and theoretically underdeveloped, limiting its ability to explain project management phenomena, integrate empirical findings, and contribute to the existing body of knowledge.

The aim of this study is to identify, map, and explain the theoretical perspectives used in research on AI-enabled project management and to provide a structured synthesis of its theoretical foundations. To achieve this objective, the study applied a systematic literature review (SLR) designed in accordance with the PRISMA 2020 guidelines and the PRISMA-S extension. The literature search was conducted in two rounds using the Web of Science and Scopus databases and identified 712 records published between 2015 and 2025. Following screening and full-text eligibility assessment, 10 studies were retained as the core dataset for analysis.

The analysis shows recurring patterns in how the literature explains AI-enabled project management. The reviewed studies include both conceptual and empirical research and draw on several theoretical perspectives. Across the reviewed studies, AI is most often described as decision-support or as augmentation of managerial capabilities. Its impact on project management is mainly explained through several dominant perspectives, suggesting a focus on the functional role of AI. The findings also indicate that there is no single dominant theory explaining AI-enabled project management, instead, the literature relies on several parallel ways of interpreting the role and impact of AI.

This study contributes by mapping the theories and synthesising them to explain how the literature interprets the impact of AI on project management. The analysis identifies recurring patterns and highlights the limited use of explicit theoretical frameworks and the need for stronger theory-driven research, including the exploration and adaptation of alternative theoretical perspectives to better explain AI-driven changes and innovation in project management.

**Keywords**— artificial intelligence, project management, AI-enabled project management, theoretical foundations, systematic literature review, phenomena-driven research, AI adoption

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# Usability of a Computer-Based Serious Game to Foster Foundational Reading Skills

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**Abstract** — Despite the evidence that playful and interactive environments can strengthen foundational reading skills, serious games designed to support the early stages of reading acquisition remain scarce. This study presents the development and evaluation of a computer-based serious game designed to train phonemic awareness in children between kindergarten and first grade. The serious game was designed to promote auditory discrimination and phonemic awareness. A usability study was conducted with a sample of 16 first-grade children. A total of eight children were identified by their teachers as experiencing reading-related difficulties, while eight demonstrated typical reading development. Each child participated in three individual ten-minute sessions within the school environment. The materials comprised the serious game, a pseudoword reading assessment to confirm reading difficulties, and a structured observational scale developed to capture detailed indicators of usability and satisfaction. The usability of the serious game was examined through systematic observation across multiple dimensions, including tutorial comprehension, initiation of gameplay, auditory and visual perception of stimuli, ease of progression through tasks, interpretation of feedback, fine motor interaction, emotional responses, and behavioral evidence of engagement, confusion, frustration, or confidence. These observations were supplemented with post-session satisfaction ratings. With regard to satisfaction, children who did not exhibit reading difficulties consistently provided favorable responses. Conversely, children with reading difficulties demonstrated a more heterogeneous pattern of responses. Taken together, these findings suggest that the game is usable and engaging for early readers. The integration of a detailed observational usability instrument with implementation in school settings represents a significant contribution to ongoing discussions surrounding the development and evaluation of learning oriented serious games. The results of the study are particularly pertinent to educators and designers seeking to incorporate evidence-informed, developmentally responsive digital tools into early literacy instruction. In conclusion, this exploratory investigation emphasizes the potential of computer-based serious games as accessible tools for phonemic awareness development and underscores the necessity for iterative design improvements that reflect the diverse literacy profiles of young learners. Subsequent iterations will incorporate refinements informed by observational data to enhance both accessibility and pedagogical effectiveness.

**Keywords**—children, early reading, phonemic awareness, reading difficulties, satisfaction, serious games, usability.

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# Virtual Reality and Augmented Reality in Teacher Training: Redefining Pedagogical Practices in Higher Education

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**Abstract** - This paper presents and analyses a training session, developed within the scope of the Erasmus+ project “The Power of AR & VR”, aimed at 26 Master’s students in Computer Science Teaching at the University of Minho, dedicated to exploring Virtual Reality (VR) and Augmented Reality (AR) in Higher Education contexts. The training was designed from a constructivist standpoint, integrating immersive tools — namely the ClassVR platform, the DelightEx application, and immersive web environments — with the aim of fostering more meaningful, interactive, and student-centred learning experiences. The session challenged participants to reflect not only on the available tools, but fundamentally on the pedagogical intentionality that should guide their use, the design of immersive experiences, and the transformative role of digital innovation in redefining teaching practices. The observed outcomes point to a positive impact on motivation, active engagement of trainees, and their predisposition towards the pedagogical integration of these technologies in their future professional practice. The study contributes to the emerging literature on immersive technologies in Higher Education, underlining the need for teacher training programmes that articulate technological literacy with critical pedagogical reflection.

**Keywords** - Virtual Reality; Augmented Reality; Teacher Training; Higher Education; Immersive Technologies; Pedagogical Innovation; Meaningful Learning

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# Which is the First Portuguese School of Economics and Management?

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**Abstract** — The institutional history of Portuguese business and economics education is marked by competing claims regarding its origins. On the official websites of Instituto Superior de Contabilidade e Administração de Lisboa (ISCAL) and Instituto Superior de Economia e Gestão (ISEG), both institutions present themselves as the first Portuguese school of economics and management and claim to be the legitimate successors of the Instituto Superior de Comércio de Lisboa (ISC), founded in 1911. ISCAL goes even further by describing itself as the first economics and management school in Europe.

Given these apparently contradictory claims, this paper addresses three research questions: (1) which institution can legitimately be considered the successor of ISC; (2) which institution may claim the status of the first Portuguese economics and management school; and (3) whether the assertion that ISCAL is the first such school in Europe can be historically justified.

To answer these questions, the study analyses Portuguese official legislation from 1759, when the Aula de Comércio de Lisboa was established, often considered the earliest Portuguese institution in this field, until the moments when ISCAL (1976) and ISEG (1989) adopted their current designations.

The analysis suggests that ISC evolved institutionally into ISEG, making the claim that ISCAL replaced ISC historically inaccurately. It also shows that determining the first Portuguese school of economics and management depends on whether the Aula de Comércio de Lisboa is interpreted as a higher education institution or as secondary education. Finally, while ISCAL may plausibly claim primacy in Portugal under certain interpretations, the claim that it is the first such school in Europe appears historically unlikely.

**Keywords** — Business and Management Education, History of Economic Education, Portuguese Higher Education System, ISCAL, ISEG.

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