



Research Topics

Technologies and Skills Intelligence

The analysis focuses on the impact of emerging technologies on workforce skills, leveraging NLP techniques to map innovation dynamics, technology trends and skills demand, gaining insights on Artificial Intelligence, cybersecurity, and green technologies.



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Design and Management for Higher Education and Training

The analysis concerns data-driven models supporting universities and professional education, with a focus on skills mapping to identify training needs and curriculum development for reskilling, upskilling and life-long-learning.

AI-Driven Methodologies for Data-Driven Decision Making

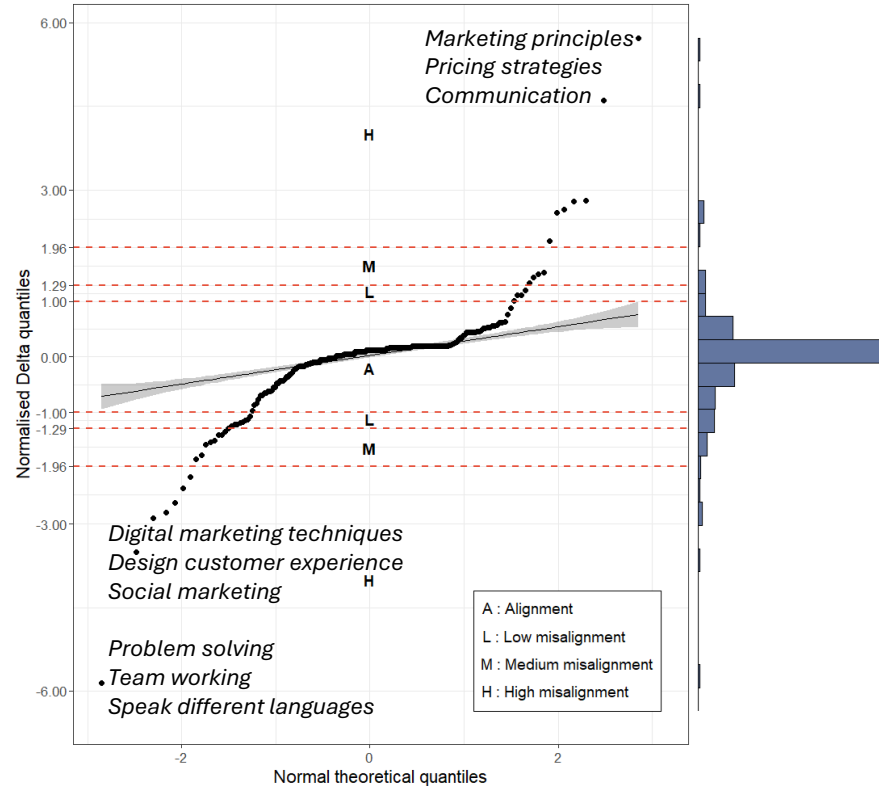
The methodological approach leverages Artificial Intelligence, Text Mining, and Natural Language Processing to analyze textual data, such as scientific publications, job vacancies, course descriptions, reports, and policy documents, for generating data-driven insights to support decision-making in business, policymaking, and education.



Bridging the Gap between Higher Education and Labour Market

- **Objective:** Assess the alignment between degree programmes and labour market demands to enhance course design effectiveness.
- **Approach:** Extract skills from job vacancies and course descriptions using Named Entity Recognition techniques (lexicon-based, rule-based, and semantic similarity) to quantify gaps and alignment. A case study in the marketing field is presented.
- **Key Findings:** The highlights on skill demands in the marketing field provide insights for updating educational programmes – particularly in soft and digital skills – to better meet labor market needs.

Spada, I., Chiarello, F., Barandoni, S., Ruggi, G., Martini, A., & Fantoni, G. (2022). Are universities ready to deliver digital skills and competences? A text mining-based case study of marketing courses in Italy. *Technological Forecasting and Social Change*, 182, 121869.





Tracking Emerging Trends and Changes in Higher Education

- **Objective:** Analyze how educational offer has evolved over the past decade in response to technological and social transformations.
- **Approach:** 54,535 learning outcomes from degree programmes across 10 academic years in Italy were analyzed to identify emerging topics, track their trends over time, and examine their distribution across disciplines and geographical areas.
- **Key Findings:** Universities are adapting to emerging trends. Fast-growing areas include AI, sustainability, rare diseases, and ethics. Hard sciences dominate, but interdisciplinary approaches and vertical specialization are increasing.

Spada, I., Giordano, V., Chiarello, F., Abate, M., Dovetto, F. M., & Fantoni, G. (2024). Tracing topic evolution in higher education: a text mining study on Italian universities. *Studies in Higher Education*, 49(11), 1965-1983.

Percentage of Shared Topics in the disciplinary areas of the Italian HE System

	2022/2023													
14 - Political and social sciences	8.06	3.19	5.68	5.36	6.71	9.04	7.41	9.09	8.95	10.48	13.12	8.06	13.75	
13 - Economics and statistics	8.88	3.66	7.13	6.37	8.23	10.19	9.99	10.57	11.74	9.85	12.14	8.23		13.75
12 - Law	5.5	2.4	4.33	3.75	4.71	5.86	5.18	5.54	5.85	6.06	6.93		8.23	8.06
11 - Historical, philosophical, pedagogica...	7.79	3.52	6.55	5.83	8.64	11.89	8.08	9.33	9.33	11.29		6.93	12.14	13.12
10 - Sciences of antiquity, philological-L...	6.78	3.03	5.34	5.14	5.94	7.63	6.21	8.15	8.05		11.29	6.06	9.85	10.48
9 - Industrial and information engineering	10.1	5.47	8.82	7.04	8.71	11.48	9.54	11.73		8.05	9.33	5.85	11.74	8.95
8 - Civil Engineering and Architecture	7.41	3.84	7.05	7.43	7.04	8.5	9.24		11.73	8.15	9.33	5.54	10.57	9.09
7 - Agricultural and veterinary sciences	6.31	3.54	7.9	6.8	9.49	10.16			9.24	9.54	6.21	8.08	5.18	9.99
6 - Medical sciences	7.29	4.19	8.3	5.85	11.96		10.16	8.5	11.46	7.63	11.89	5.86	10.19	9.04
5 - Life sciences	5.76	3.59	8.26	6.13		11.96	9.49	7.04	8.71	5.94	8.64	4.71	8.23	6.71
4 - Earth sciences	4.89	3.37	5.56		6.13	5.85	6.8	7.43	7.04	5.14	5.83	3.75	6.37	5.36
3 - Chemical sciences	5.5	3.91		5.56	8.26	8.3	7.9	7.05	8.82	5.34	6.55	4.33	7.13	5.68
2 - Physical sciences	3.81		3.91	3.37	3.59	4.19	3.54	3.84	5.47	3.03	3.52	2.4	3.66	3.19
1 - Mathematical and computer science	3.81	5.5	4.89	5.76	7.29	6.31	7.41	10.1	6.78	7.79	5.5	8.88	8.06	

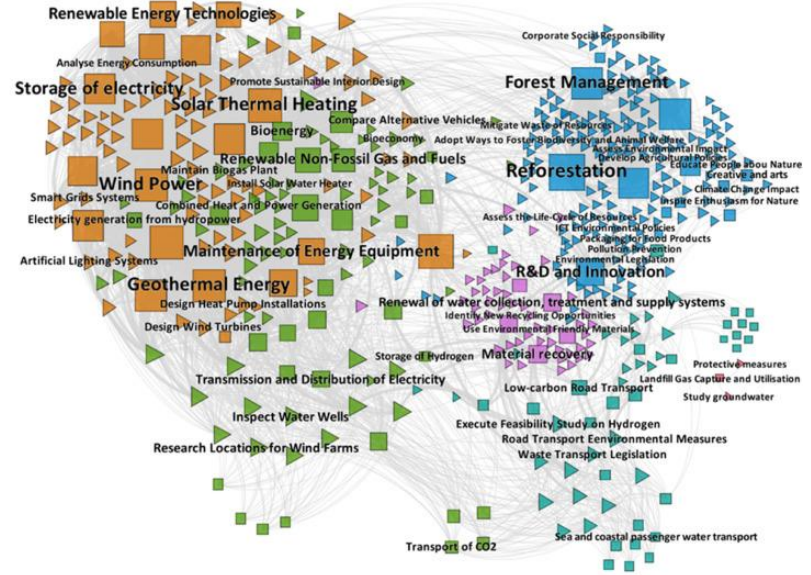


<https://ispada.shinyapps.io/AppTopicUni/>



Mapping Key Competencies and Activities for Sustainability

- **Objective:** Identify key competencies and activities for sustainability in response to green transition.
- **Approach:** Extract green-related terms from policy documents (EU Taxonomy for Sustainable Activities (EU-TSA) and the Green Concepts of the European Classification of Skills/Competences, Qualifications and Occupations (ESCO)) using lexicon-based Named Entity Recognition technique. Graph Theory is applied to construct a network that maps ESCO competencies to the corresponding EU-TSA tasks.
- **Key Findings:** The resulting network organizes skills and activities into six distinct clusters, highlighting key enabling competencies and essential activities for sustainability.



Spada, I., Giordano, V., Chiarello, F., Martini, A., & Fantoni, G. (2025). Text mining on green policies for integrating sustainability in higher education. *The International Journal of Management Education*, 23(2), 101126.

Nodes Shape		Nodes Size		Nodes Color (in brackets the size of the cluster)	
□	Activity of EU-TSA	1 ○ ○ ○ 142	Degree	Protection and management of natural environment (38,58%)	Waste management (11,13%)
▷	Competence of ESCO Green Collection	1 — 5	Weight	Energy generation, transmission, storage, and distribution (20,54%)	Sustainable mobility and transportation (10,13%)
				Management of renewable energy (18,81%)	Landfill gas utilization (0,58%)