JOURNAL OF E-LEARNING AND KNOWLEDGE SOCIETY
Vol. 19, No. 4 (2023), pp. 50-75

Students in Italian online universities: enrollments time series analysis from 2005 to 2021

Tommaso Minerva[1], Annamaria De Santis, Claudia Bellini, Katia Sannicandro

University of Modena and Reggio Emilia, Surgical, Medical, Dental and Morphological Sciences Department – Reggio Emilia (Italy)

(submitted: 31/8/2023; accepted: 2/1/2024; published: 6/2/2024)

Abstract

The advent, in 2004, of online universities in Italy followed the global trend of open and distance learning institutions. Within a brief span, the authorization of as many as 11 online universities was granted. Despite ongoing regulatory revisions and a prevailing skepticism regarding the actual quality of education these institutions furnish, student enrollment continues to rise annually. This study explores enrollment trends in Italian online universities from their inception through 2021, considering concurrent enrollment trends in traditional public and private universities. Additionally, we examine in detail the gender composition, subject areas of degree programs, and, most importantly, the geographic origins of enrolled students.

KEYWORDS: Online Universities, Distance Education, Quality Assurance, Italian University System, Students' Enrollment.

DOI
https://doi.org/10.20368/1971-8829/1135872

CITE AS
Minerva, T., De Santis, A., Bellini, C., & Sannicandro, K. (2024). Students in Italian online universities: enrollments time series analysis from 2005 to 2021. *Journal of e-learning and Knowledge Society*, *19*(3), 50-75.
https://doi.org/10.20368/1971-8829/1135872

1. Introduction

In this study, we analyze the enrollment trends in Italian online universities compared to public or private ones that deliver courses in the traditional mode. The analysis considered gender composition, subject areas of degree programs, and geographic origins of enrolled students since the early 2000s (when online universities in Italy were first established) till 2021.

Universities and colleges began experimenting with online courses in the early to mid-1990s, with the introduction of the Internet and the development of digital technologies, but it was in the early 2000s that they started to gain traction (Kentnor, 2015).

At the beginning of 2000, the role and the pedagogical, economic, and organizational implications in the education and training systems that open, digital and distance learning will have to assume were almost clear. By that time, distance education occupied an important role in more regions of the world, where single-mode public institutions were founded, traditional institutions passed to dual-mode, and the interest of private institutions or founders came to the fore (Patru & Khvilon, 2002).

Defined as a method of teaching where the student and teacher are physically separated, still today, *distance education* concerns the utilization of a combination of technologies: correspondence, radio, TV, and CD-ROM, Internet-based information technologies, and World Wide Web (Roffe, 2004; Zawacki-Richter & Jung, 2023).

This term overlaps with most recent *online education*, but not all distance education is online, and not all online education is via distance; online education can be considered a "type" of distance education, the more recent.

Online universities (also known as virtual universities, virtual campuses, off-campus universities, distance universities, or cyber universities) refer to institutions that offer higher education online courses and can have one or more physical sites. Some conventional

[1] corresponding author - email: tommaso.minerva@unimore.it – address: Viale Timavo 93, 42123 Reggio Emilia (Italy)

universities provide online courses in addition to traditional offerings although they are not virtual.

Speaking of universities, the adjective *open* is sometimes used as a synonym for *online*, but the overlapping is not complete also in this case. The first open universities were established more than fifty years ago with the objective of inclusion for all people who, for various reasons (inability to access schooling, lack of resources or qualifications etc.) could not attend a traditional university. These institutions are based on an open-door academic policy, with minimal or no admission requirements (Garavaglia & Pasta, 2021). Distance education added flexibility to this model, making higher education available also from remote locations, offering possibilities (sometimes second opportunities) to adults, workers, people with disabilities, dropouts, and so on. Today, they are spread worldwide (see Table 1 for a non-exhaustive list), including developing countries such as Nigeria, Argentina, and India where there is Indira Gandhi National Open University, one of the biggest in the world. Some open universities are considered *mega* universities based on the fact that their enrollment is more than 100 thousand students (Quayyum & Zawacky-Richter, 2018).

Table 1 - A (not-complete) list of open universities in the world.

University	Type	Headquarters	Inception
Universidad Abierta Interamericana	private nonprofit	Argentina	1995
University of the West Indies Open Campus	public	Barbados	1960
Botswana Open University	public	Botswana	2011
Athabasca University	public	Canada	1972
Télé-université	public	Canada	1972
Thompson Rivers University, Open Learning	public	Canada	2005
The Open University of China	public	China	2012
Universidad Nacional Abierta y a Distancia	public	Colombia	1981
Open University of Cyprus	public	Cyprus	2002
Hellenic Open University	public	Greece	1992
Indira Gandhi National Open University	public	India	1985
The Open University of Japan	private	Japan	1983
Korea National Open University	public	Korea	1972
Open University Malaysia	private	Malaysia	2000
Open university of Mauritius	public	Mauritius	2012
Universidad Abierta y a Distancia de México	public	Mexico	2009
Open Universiteit of the Netherlands	public	Netherlands	1984
National Open university of Nigeria	public	Nigeria	2002
Virtual University of Pakistan	public	Pakistan	2002
Universidade Aberta of Portugal	public	Portugal	1988
Universidad Nacional de Educación a Distancia (UNED)	public	Spain	1972
Universitat Oberta de Catalunya (UOC)	private	Spain	1995
The Open University of Tanzania	public	Tanzania	1992
Sukhothai Thammathirat Open University (STOU)	public	Thailand	1978
The Open University	public	UK	1969
Open University of Human Development “Ukraine”	public	Ukraine	1999
Taras Shevchenko National University	public	Ukraine	2017
Intercultural Open University Foundation	private	US	1981
Zimbabwe Open University	public	Zimbabwe	1999

Online education's popularity is largely attributed to its flexibility, aligning with the goal of inclusion. This mode of learning allows students to engage with their coursework on their own schedules, from any location globally. They have access to course materials, multimedia resources, and interactive activities through digital technologies. Additionally, they can collaborate with instructors and peers in virtual environments. This flexibility is particularly beneficial as it enables students to reside in their preferred locations, harmonizing their educational pursuits with existing work and family responsibilities. This approach also circumvents the challenges associated with the student rental market, an issue that has become increasingly pressing in Italy recently.

Online education, while presenting challenges such as the necessity for learners to be self-directed and motivated, has seen significant advancements in information and communication technologies. These advancements make online learning more viable from technological, economic, and operational standpoints (Palvia et al., 2018). Achieving cost efficiency in this domain often hinges on massive enrollments and the effective utilization of technology, strategies that typically entail substantial initial investments and yield benefits over the long term (Paul, 2023).

Furthermore, online and distance education, with their lower physical infrastructure requirements and associated costs, are increasingly viewed as solutions to meet the growing global demand for education. This demand is driven by the rising world population and concerted efforts by governments and policymakers to promote education, innovation, and lifelong learning (Qayyum & Zawacki-Richter, 2019).

The proliferation of distance education varies across countries, influenced by distinct policy decisions, government regulations, and the ways in which nations and their educational systems respond to the overarching process of digitization (Qayyum & Zawacki-Richter, 2018).

We start by exploring the evolving landscape of open and online university education globally and within Europe, outlining key trends in enrollment and diffusion. This overview provides a broader context, highlighting how various regions and countries are adapting to and embracing digital education platforms.

After establishing this international and European backdrop, the paper will then narrow its focus to the Italian context.

Brazil

In Brazil, we are assisting a general increase of enrollments in higher education (9 million, around +33 percent from 2012) together with a diffusion of the private sector, representing 88 percent of HE institutions (32 percent, private nonprofit; 56 percent, private for-profit).

Distance education enrollments achieved more than 4 million in 2022, which is 45.9 percent of total degree enrollments. The public institutions covered only 4 percent of distance learning course enrollments in the same year.

Between 2012 and 2022, the percentage of first-year students enrolled in distance learning degree courses increased by 288.8 percent, while in face-to-face mode, there was no growth but a decline of -13.7 percent (República Federativa do Brasil, 2023).

United States

In the United States, after a general increase in university enrollments from 2000 to 2010, a decline began from 2010 onward, affecting undergraduate enrollment mostly instead of growth in post-baccalaureate courses. In 2021, 61 percent of the 15 million undergraduate students attended a distance education course; those enrolled exclusively in distance education mode are 28 percent. For post-baccalaureate, 56 percent of the 3 million enrolled have participated in at least one distance education course, and 40 percent attended exclusively distance education programs (NCES, 2023).

Compared to 2015, the percentages have greatly increased: undergraduate students enrolled in single courses represented 29 percent, and exclusively in distance education, 12 percent; post-baccalaureate students in single course, 34 percent, and exclusively in distance education, 26 percent (McFarland et al., 2017).

In fall 2021, for-profit institutions gained the highest percentage of distance education enrollments on those in their courses, although students choosing this type of institution is the lowest compared to public and private nonprofit institutions (5 percent). Anyway, distance education enrollment rates have increased in public, for-profit and nonprofit institutions with the highest percentages in the first one (NCES, 2023; McFarland et al., 2017).

Asia

In Asia, distance education allowed increasing access to and equity in education, particularly at the higher education level. By 2011, around 70 open universities offered online learning mode courses, together with printed and multimedia learning materials, broadcast radio and television, and an increasing number of traditional schools and for-profit providers offering distance education. South Korea has the Korea National Open University (137 thousand enrollment) and 19 cyber universities (147 thousand enrollment); Malaysia has at least two open universities and one cyber university, and open universities are also in Thailand, Japan, Sri Lanka, Philippines, and Indonesia (Belawati, 2022; Ministry of education of Korea, 2023).

The trends in India and China, the countries with the highest populations in the world, deserve special mention.

India

The educational system in India (Government of India, Ministry of Education, n.d.) has dizzying numbers: around 41 million students were enrolled in higher education in 2020-21 (+21 percent from 2014-15) in more than 56 thousand universities, colleges, and other HE institutions.

Distance enrollments represented about 11 percent of the total enrollment in higher education. In particular, enrollments in distance mode at universities corresponded to 51 percent of university enrollment, of these 65 percent at undergraduate level and 28 percent at postgraduate level.

In 2020-21, 16 Open universities (1 Central University, 14 State Universities, and 1 State Private University) and 112 Dual Mode Universities offered education through distance mode (Government of India, Ministry of Education, n.d.). The Central Open Universities, the already cited Indira Gandhi National Open University (IGNOU), which defines itself as the world's largest university in terms of enrollments, recorded about 1.3 million enrollments in a.y. 2021/22 (+200 thousand since 2017) (IGNOU, 2022).

China

In China, the Ministry of education declares that in 2022 there were 46 million students in all higher education institutions and over 3 thousand HE institutions (Ministry of education of China, 2023).

In the country's official statistics pages, 8.7 million enrollments as web-based undergraduates are recorded in 2021 compared to 6.2 million in 2013 (Ministry of education of China, 2022; 2014).

The Open University of China, as a governance initiative derived from China Central Radio and TV University (CCRTVU), offers degree and non-degree courses together with many local open universities (Li & Chen, 2019).

Australia

Moving to Australia, today, 26 universities delivering undergraduate and postgraduate degrees, university certificates, pathways and pre-university, single subjects, microcredentials, and short courses make up Open Universities Australia, a nonprofit organization founded in 1993 (Latchem, 2018), which in its three decades of existence, has provided a wide catalogue of higher education programs to 500,000 learners.

Africa

The open universities of Tanzania, Nigeria, Mauritius, Botswana, Zimbabwe are located in Africa, a continent that has a lower gross enrollment ratio in tertiary education (Sub-Saharan Africa = 9 percent, 2021) but also a higher percentage of young population (Sub-Saharan Africa, 0-14 ages = 42 percent, 2022) that hopefully will access to tertiary education in the coming years (The World Bank, 2023a; 2023b).

The best-known university with a longer history in distance education is University of South Africa that annually gives study opportunities to over 370,000 students from South Africa and about 110 countries in Africa and other countries in the world. Traditional universities deliver online programs, for example, the University of Pretoria in South Africa (Prisloo, 2019), Mulungushi University in Zambia, and Kenyatta University in Kenya. Private intra-continental online campuses are offering online education, such as Botho University (campuses: Botswana, Lesotho, Namibia, Eswatini, Ghana) or Unicaf University (licensed in Malawi, Zambia, Uganda, Zimbabwe).

Europe (Spain and United Kingdom)

Europe has seen a growing of open public universities since the 70s' such as The Open University in UK, Universidad Nacional de Educación a Distancia (UNED), and later, in the 1980s, Open Universiteit of the Netherlands, and Universidade Aberta of Portugal (see Table 1). Currently the scenario of public European open universities is enriched in the Greek area by Hellenic Open University founded in 1992 and the smaller Open University of Cyprus (2002), or by the Ukrainian universities called Open University of Human Development "Ukraine" (1999) and Taras Shevchenko National University (2017). Among the private open universities we cannot fail to mention the Universitat Oberta de Catalunya (UOC) established in 1995 and among the best known in the Ibero-American context.

Many European universities are expanding the programs delivered in a fully online or hybrid mode. Examples are FernUniversität in Hagen (Germany), University of Oxford (UK), European University Cyprus, and Swiss School of Business and Management (Switzerland).

We assist in developments in ICT, the growth of marketization, and the increase in private and for-profit online companies involved in education (Sursock, 2015).

In 2013, almost all of the 249 European HE institutions (among 800) from 38 European systems (EU and wider Europe) in a survey from the Europe University Association (EUA) declared to have started to use e-Learning: 91 percent offered blended learning integrating traditional teaching and 82 percent online

courses. However, initiatives were mainly introduced by individual faculties and staff members; only half of the respondents indicated to use e-Learning throughout the institution; the distance education activities of less than one third of institutions involve all or most of students, and only 20 percent in all disciplines. The initiatives' implementation seemed inconsistent and patchy, so it appears to be a recent development and a cautious exploration (Gaebel et al., 2014). Compared to 2014, in a following survey administered to European HE institutions in 2020 (Gaebel, 2021; 2023), institutional approaches towards distance learning tend to be more centralized, systematic and strategic. 88 percent of 368 institutions have a strategy for distance education (63 percent in 2014), and 57 percent of the respondents reported that digitally enhanced learning and teaching were widely used throughout their institution in 2020 (53 percent in 2014).

Situations in each country deserve an in-depth study, and they differ in policies, development possibilities, and educational systems.

In Spain, only six of the 86 universities in the country are distance education universities; of these, only one, Universidad Nacional de Educación a Distancia (UNED), is a public university. In a.y. 2021/22 in the the country, the first-year students enrolled in courses in online mode represent 17.3 percent (total first-year students: 1.7 million). Some minor changes can be recorded compared to a.y. 2011/12, when the percentage was 15.2 percent (total first-year students: 1.6 million) (Ministerio de Universidades, Gobierno de España, 2023; Ministerio de Educación, Cultura y Deporte; 2012).

Report on the United Kingdom by the Higher Education Statistics Agency (HESA, 2023) shows that in a.y. 2021/22, 2.8 million students were enrolled in 285 HE providers. Of these, 153 entities were offering distance education, reaching 9.7 percent of students. The UK Open University covered 150 thousand students, 5.3 percent of all British students and 54.4 percent of those in distance education. Few years before, in a.y. 2014/15, 2.3 million students were enrolled in higher education in 226 institutions; 8.3 percent of students attended distance education courses in 112 institutions; UK Open University had 132 thousand students, that is 5.7 percent of the total enrollments and 68.7 percent of distance education enrollments. Over the years, learners enrolled in the Open University have increased, but it involves fewer percentage of students in the UK.

Having examined the global and European landscapes of online and open university education, we now turn our attention back to Italy.

In Italy, some public universities, together with traditional degree courses, offer blended or online programs since decree No. 635/2016 by Ministry of education, university and research that distinguished them into four typologies based on the percentage of online activities proposed: traditional courses till 10 percent; blended courses with less than 2/3; mainly online with more than 2/3; fully online with all activities at a distance. In all cases, exams are given face-to-face even if the COVID pandemic changed this scenario.

In the country, there aren't public fully online (nor open) universities but 11 private universities (Table 2), whose enrollment trend is the focus of the paper. Their institution has been proposed by decree dated 17 April 2003 by the Italian Ministry of education (in Italy, as understood, the institution of new degree courses and universities is managed through a centralized process). They were established in the following three years after the decree. The headquarters of six of them are in Rome. The others are distributed in the North (1, Lombardia), Center (2, Abruzzo and Toscana), and South (2, Campania). Three of them are under public control.

Table 3 shows the number of courses delivered by Italian traditional and online universities in a.y. 2023/24 and divided according to the four types described above. See Table 4 for the correspondence between Italian and English terms in identifying higher education programs.

Unexpectedly, online universities offer courses principally in mainly online mode; in fact, 143 of 155 courses (92 percent) fall into this category, evidencing that they have abandoned fully online mode and moved toward mainly online including on-campus activities. Traditional universities offer 96.5 percent of courses (4,913) in the first category (face-to-face). The remaining 3.5 percent is divided among blended, mainly, and fully online modes, with a clear predominance for blended courses representing 2.9 percent (149) of those by traditional universities.

Traditional universities prefer to deliver master's courses in the blended and mainly online mode more frequently; instead, 4 of the 5 courses in the online mode are bachelor's courses. Online universities, on the other hand, have more bachelor's courses in the mainly online mode. There is a tie in the online mode between bachelor's and master's programs delivered by online universities.

As we will see in Section 3, the enrollment percentages in these universities, so called "telematiche", go from a few hundred to tens of thousands. Beyond online delivery mode, these universities frequently have in common: year-round open enrollment, discounts in tuition for particular categories or conventions, unrestricted access to degree programs, provision of numerous professional development short programs, tutoring processes, and simplified access to single courses.

Table 2 - Description of Italian online universities (data from universities' websites, USTAT and CercaUniversità, open data services of Ministry of Universities; the values in the last column refer to 2022.
T = tenured professors and researchers; C1 = contract faculty; C2 = contract faculty from other universities).

University	Establishing decree	Headquarters	Sites	Courses	Faculties/Main Themes	Professors/ researcher/ faculty
Università telematica Guglielmo Marconi	1.3.2004	Roma	25 sites for guidance and exams	12 bachelor's and 10 master's courses, 1 five-years course, 10 basic and 17 advanced specialization courses + others 30 with 24ORE Business School, Ph.D. programs, 39 training courses for students and professionals, more than 30 specialization and short courses for teachers	Faculties in Humanities, Law, Political science, Economics, Engineering, Education Departments in Humanities, Law, Economics, Engineering	68 (T) 134 (C1) 3 (C2)
Università telematica Unitelma Sapienza	7.5.2004	Roma	27 teaching centers	4 bachelor's and 3 master's courses, 1 five-years course, more than 50 specialization courses (39 basic and 11 advanced), 35 short training courses	Law, Economics, Computer Science, Psychology, and Archaeology	33 (T) 30 (C1) 22 (C2)
Università telematica Leonardo da Vinci	27.10.2004	Torrevecchia Teatina (CH)	9 sites for exams	1 bachelor's, 1 master's, and 1 five-year courses, Ph.D. programs, 23 basic and 1 advanced specialization courses	Humanities, Law, and Economics	1 (T) 30 (C1) 90 (C2)
Università telematica internazionale Uninettuno	15.4.2005	Roma	105 national/ international technological poles 26 sites for exams in Italy	6 bachelor's and 7 master's courses with more curriculums, Ph.D. programs, 29 specialization courses, around 20 short learning programs, a program for refugees	Faculties in Cultural Heritage, Economics and Laws, Engineering, Psychology, Communication Sciences	34 (T) 339 (C1) 476 (C2)
Università telematica degli Studi IUL	2.12.2005	Firenze	More than 40 sites	5 bachelor's and 2 master's courses, 15 basic and 1 advanced specialization courses, and around 15 training courses	Psychology, Sport, Economics, Communication sciences	8 (T) 122 (C1) 11 (C2)
Università telematica e-Campus	30.01.2006	Novedrate (Co)	58 sites, 34 guidance points, approximately 500 study centers	15 bachelor's and 9 master's courses, 1 five-years course, Ph.D. programs, more than 100 specialization courses, around 50 short training courses for teachers, healthcare and public administration workers, CME courses	Faculties in Law, Engineering, Economics, Psychology, and Humanities	103 (T) 305 (C1) 30 (C2)
Università telematica Giustino Fortunato	13.4.2006	Benevento	4 sites for exams 29 guidance centers	5 bachelor's and 3 master's courses, 1 five-years course, Ph.D. programs, 20 basic, 6 advanced, and 2 international specialization courses, 26 short courses and teachers' training	Psychology, Law, Economics, Sport Science, Education, and Engineering	44 (T) 73 (C1) 0 (C2)
Università telematica Pegaso	20.4.2006	Napoli	82 sites for exams around 1,000 e-Learning Center Points	8 bachelor's and 5 master's courses, 1 five-years course, Ph.D. programs, 95 basic, 23 advanced specialization courses, 40 training courses, teachers' training	Faculties in Economics and Law, Engineering and Informatics, Education and Sports	64 (T) 335 (C1) 0 (C2)
Università telematica San Raffaele	8.5.2006	Roma	50 sites for exams	4 bachelor's and 3 master's courses, Ph.D. programs, 26 basic and 30 advanced specialization courses and for teachers' training	Fashion and Industrial Design, Economics, Education, Psychology, Health, Food and Sport Sciences	57 (T) 129 (C1) 2 (C2)
Università telematica Mercatorum	10.5.2006	Roma	66 sites for exams	14 bachelor's and 5 master's courses, 24 basic and 8 advanced specialization courses, Ph.D. programs, projects for schools and enterprises, teachers' training	Economics, Engineering, Humanities, Design/Fashion, Psychology, Law, and Political/Social/ Communication Science	60 (T) 158 (C1) 24 (C2)
Università telematica Niccolò Cusano	10.5.2006	Roma	83 learning centers	12 bachelor's and 14 master's courses, 1 five-years course with more curriculums, Ph.D. programs, around 200 specialization courses and nearly 70 short programs, teachers' training	Engineering, Law, Economics, Psychology, Political/Social Science, and Education, Sport, Humanities, Health	109 (T) 737 (C1) 7 (C2)

Table 3 - Number of courses by typologies, a.y. 2023/2024. (Source: Universitaly).

Courses and Universities	Bachelor's	Five/Six-year courses	Master's	Total
Traditional (less than 10%)	*2254*	*347*	*2312*	*4913*
Traditional universities	2254	347	2312	4913
Online universities	0	0	0	0
Blended (less than 2/3)	*55*	*4*	*90*	*149*
Traditional universities	55	4	90	149
Online universities	0	0	0	0
Mainly online (more than 2/3)	*90*	*7*	*69*	*166*
Traditional universities	10	1	12	23
Online universities	80	6	57	143
Fully online	*10*	*1*	*6*	*17*
Traditional universities	4	0	1	5
Online universities	6	1	5	12
Total	*2409*	*359*	*2477*	*5245*
Traditional universities	2323	352	2415	5090
Online universities	86	7	62	155

Table 4 - English translation of the Italian terms referred to higher education programs adopted in the paper.

English translation	Italian term	Description	ECTS
Bachelors' degree courses	Laurea (1° ciclo)	Three-year basic programs accessed with a high school diploma	180
Masters' degree courses	Laurea Magistrale/ Specialistica (2° ciclo)	Two-year advanced programs accessed with bachelors' degree	120
Five or six-year courses	Lauree a ciclo unico	Long programs such as in Medicine or Law accessed with a high school diploma	300/ 360
Basic specialization courses	Master di primo livello	Program lasting one or two years on a specialized topic accessed with bachelors' degree	60/ 120
Advanced specialization courses	Master di secondo livello	Program lasting one or two years on a specialized topic accessed with masters' degree or five or six-year courses	60/ 120
Training courses or short courses	Corsi di perfezionamento/ aggiornamento/formazione	Courses of various kinds that do not always require a degree for entry and that address specialized topics often for professional training	-

The first online university officially recognized by the Italian Ministry of education in 2004 is "Università telematica Guglielmo Marconi" which currently has six faculties and four departments (Humanities, Law, Political science, Economics, Engineering, and Education), and 12 bachelor's and 10 master's degree, 1 five-years course, Ph.D. programs, teachers training initiatives, around 30 basic and advanced specialization courses and more than 30 others in collaboration with another private entity, 24ORE Business School.

In the same year, the ministry also instituted the "Università telematica Unitelma Sapienza" and "Università telematica Leonardo da Vinci". Both universities are linked to public ones: the first one is managed by a consortium whose majority shareholder is Sapienza University of Rome (a mega university) and offers degree courses in Law, Economics, Computer Science, Psychology, and Archaeology. The second one, the smallest for enrollments, was wholly owned by the public University of Chieti and offers

three degree courses in Humanities, Law, and Economics together with Ph.D. programs and specialization courses.

"Università telematica internazionale Uninettuno" and "Università telematica degli Studi IUL" were established in 2005.

Uninettuno started from Nettuno Consortium, a network of 43 Italian and foreign universities already active in distance education since the 90s that provided a degree to thousands of students via television and internet. It maintained an international approach in the years with a focus on the Mediterranean area: students come from 167 countries around the world, courses are taught in five languages (Italian, French, English, Arab and Greek), and 105 National and International Technological Poles are distributed globally (26 sites for exams in Italy). It offers nowadays courses (6 bachelor's and 7 master's degree courses with more curriculum, 29 specialization courses, short learning programs, Ph.D. course, a program for refugees) in Humanities, Economics, Laws, Engineering, Psychology, Communication Sciences.

IUL is currently promoted by the public University of Foggia (succeeded the University of Firenze) and INDIRE (National Institute for Documentation, Innovation and Educational Research, Ministry of Education's research organization). The proposed courses focus mainly on Education but also Psychology, Sport, Economics, Communication sciences.

In 2006, the institution of the last six online universities completed the scenario that remains *unchanged* to date. We described them according to their institution's data.

"Università Telematica e-Campus" is organized into faculties and offers 15 bachelor's and 9 master's degree courses, 1 five-years course, Ph.D. programs, numerous specialization courses also for teachers, healthcare and public administration workers. E-Campus is a provider of continuing medical education (CME) credit activities. It has around 60 sites, more than 30 accredited guidance points, and approximately 500 study centers in private secondary schools located throughout Italy to support teaching activities, enrollments, and guidance activities.

"Università Telematica Giustino Fortunato" offers 5 bachelor's and 3 master's degree courses, 1 five-years course, and about 30 specialization courses and teachers' training as well as short courses. Behind 29 guidance centers, examination sites are located in big Italian cities: Milan, Rome, Palermo, and Padua.

"Università Telematica Pegaso", with its vast network of educational centers and examination sites that extend nationwide (+80) and around 1,000 e-Learning Center Points qualified for carrying out teaching, educational and training projects linked to the territory, is the largest online university in Italy. Pegaso currently offers 14 degree programs and around 160 specialization and training courses in Law, Informatics, Engineering, Tourism, Economics, Sports, Humanities, Health, Education, Philosophy, Linguistics, and so on.

"Università Telematica San Raffaele" offers 4 bachelor's and 3 master's degree courses, Ph.D. programs, and specialization courses focusing on Fashion and Industrial Design, Economics, Education, Psychology, Health, Food, and Sport Sciences.

"Università Telematica Mercatorum" started from a public-private partnership with the system of Chambers of Commerce and deals with training on entrepreneurship, the labor market, and corporate law. The main fields of courses (14 bachelor's, 5 master's, 1 five-years course, 32 specialization courses, Ph.D. programs, projects for schools and enterprises) regard Economics, Engineering, Humanities, Design/Fashion, Psychology, Law, and Political/Social/ Communication science. It has around 60 sites for exams throughout the national territory.

"Università Telematica Niccolò Cusano" formed a network of companies composed of TV, radio, a publishing house, a research center, a soccer team (Ternana), and other entities. It offers degree programs (12 bachelor's and 14 master's) that can be attended fully online or face-to-face, Ph.D. programs, and more than 200 specialization courses. Exams can be taken online or at the central campus; more than 80 learning centers in all Italian regions (except Valle d'Aosta) provide secretarial services, counseling, computerized workstations, and classrooms.

Pegaso, Mercatorum, and San Raffaele, have joined together with other not university education companies in an expanding group in the education sector in Italy called Multiversity S.p.A., which also includes training and certification entities and have a total of 40 degree courses, 200 specialization courses, 200 examination locations, and 1,000 e-Learning center points (https://multiversity.it/).

By the end of 2022, seven online universities, namely Pegaso, Mercatorum, San Raffaele, IUL, e-Campus, Leonardo Da Vinci, and Giustino Fortunato, have formed an association of Italian online universities called United (https://www.associazioneunited.it/). The association aims to become an advisory body of the Minister of University and Research and to promote the digital transformation of the Italian university system, implementing the dialogue among universities and with local, national, and European institutions.

Even though the awareness of opportunities for innovation, inclusion, and lifelong learning represented by distance education, the establishment of online universities at first was frowned upon by some bodies such as the CUN (Italian National University Council) and CNSVU (National Committee for the Assessment of the University System), a body that was in charge of university evaluation, before ANVUR which we will

introduce in a few lines. The intervention appeared to be without any planning of the university system: there were doubts (not fully resolved) about the aims of these institutions (only teaching or also research?), the number and selection of faculty and the management of changes in the programs offered (less strict than in traditional universities), the processes for assessing the quality of teaching (CUN, 2007; CNSVU, 2010).

Quality assurance of teaching, learning, and research is a hot topic for all educational providers, especially in distance and online education.

In Italy, Law No. 286 of 24 November 2006 (based on Decree No. 262/2006) established ANVUR, the Italian National Agency for the Evaluation of Universities and Research Institutes. The agency plays a central role in the accreditation and periodic assessment of universities and degree courses. ANVUR oversees the national public system of quality assessment of universities and research institutions and develops its policies according to the European Higher Education Area (EHEA) guidelines adopted in 2015 by the European Association for Quality Assurance in Higher Education (ENQA), initiating constant change and updating. ENQA documents and frameworks focus on the need to foster and facilitate student-centered approaches to a greater extent, to promote adaptable and customizable learning pathways, and to develop a system of differentiated and flexible quality assurance made of a recursive internal and external evaluation process (Figure 1; ENQA, 2005; 2008; 2015; 2020).

These processes involve public, private, and online Italian universities and aim to develop a participatory quality management system.

According to decrees on quality assurance processes and for the enhancement of the efficiency of universities (Law No. 240 of December 30, 2010; L.D. No. 19 of January 27, 2012, and subsequent decrees), ANVUR (2023a; 2023b; 2023c) defines and applies the modalities, criteria and operational guidelines in a model for evaluating and improving research and higher education systems.

While VQR is the acronym that identifies the Italian system for the Evaluation of Research Quality, the accreditation criteria and general guidelines for the planning of universities are organized in the system called AVA, which has been active in Italy since 2013. In the acronym AVA, A ("Autovalutazione" in Italian) stands for Self-assessment of universities and their courses, V ("Valutazione") for Periodic Evaluation, and A ("Accreditamento") for Accreditation. Both the last two processes are managed by ANVUR at the moment of the institution of a new degree or a new university (*Initial Accreditation*) and after, in periodic phases (*Periodic Accreditation*, at least every five years for the universities and three for courses). ANVUR updated AVA to the model of periodic accreditation of universities and courses defined AVA3 (after AVA1 e AVA2), implementing new guidelines for the Quality Assurance System of universities and their degree programs and for their evaluation in view of periodic accreditation in universities and the scopes provided by M.D. No. 1154/2021. Previous Ministerial Decrees defined the accreditation criteria (e.g., M.D. of April 17, 2003; M.D. 635 of August 8, 2016; M.D. No. 289 of March 25, 2021) and the requirements of degree courses (e.g. M.D. No. 47 of January 30, 2013; M.D. No. 987 of December 12, 2016; M.D. No. 6 of January 7, 2019; D.D. No. 2711 of November 22, 2021).

In the whole completed cycle of periodic assessment that involved traditional and online universities (Table 5), most of the latter obtained a *Satisfactory* rating (8 universities, 73 percent), only one *Fully Satisfactory* (1 percent), and two universities obtained a *Conditional* rating (18 percent). Traditional (public and private) universities received higher ratings: 7 awarded the maximum score of *Positive*, and 30 universities (38 percent) awarded *Fully Satisfactory*. The first three levels allow accreditation after five years, and the *Conditional* one implies a new accreditation in a shorter period in which the university has to overcome the critical issues found under penalty of closure. None of the traditional or online universities received an *Unsatisfactory* assessment, that means the deletion of the university (ANVUR, 2023a, p. 94).

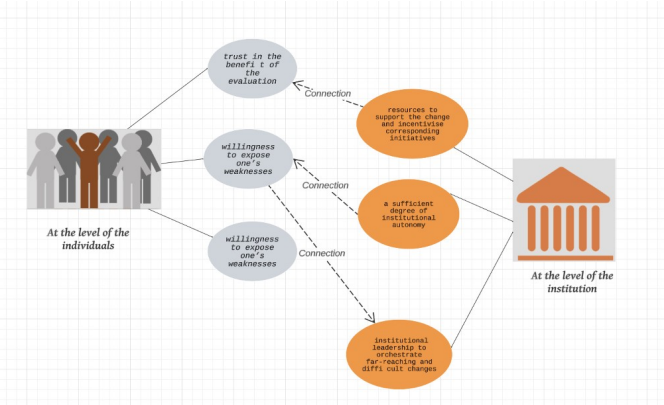


Figure 1 - Six conditions to ensure that Quality Assurance (ENQA, 2008, authors' production).

These ratings are achieved by checking the university as a whole and degree programs and attributing score to a list of criteria (M.D. No. 1154/2021; M.D. No. 6/2019; ANVUR, 2023c; 2023d) that concern both the design and delivery of courses (e.g., educational objectives and output profiles) and the management of resources (e.g., teaching staff and tutors). As clarified in the guidelines for planning of newly established courses for a.y. 2024-2025 (ANVUR, 2023c, p.15-17), for mainly or fully online courses, it is necessary to verify requirements related to methods for interaction between students and teachers, the involvement of the figures responsible for assessments (teachers and tutors); technologies and methodologies used for substituting face-to-face interaction; training for teachers and tutors to conduct online teaching; features/skills possessed by the tutors; technological infrastructure used for synchronous or asynchronous activities.

Other relevant criteria in Initial, Periodic Accreditation, and Assessment processes concern quality requirements of teaching and research. We focus, in particular, on the number and role of teachers.

In Law No. 240 of December 30, 2010, we found the internal articulation and criteria for the organization of departments in public universities to ensure an adequate number of tenured professors and researchers (more than 35).

Instead, speaking of the courses, we have to consider Annex A - Course Accreditation Requirements, M.D. No. 1154/2021. The decree calculates the minimum number of teachers according to the teaching planning in the Single Annual Forms (SUA "Scheda Unica Annuale") filled for each already accredited course that has completed at least one entire cycle of studies and for any newly established courses.

Table 6 contains the number of total and tenured teachers required for courses delivered with less than 2/3 of online activities and those delivered in mainly or fully online mode (the decree proposes other particular criteria for Health Professions courses and other selected courses which we don't mention). Professors and researchers are included in the total count; contract faculty may be counted within the maximum limit of 1/2 of the share not reserved for tenured professors. Along with these, lecturers/teachers on contracts from other universities (including foreign ones) and public research institutions or on three-year contracts even with full professor's qualifications may contribute to the teaching requirements to the limit of 1/3 of the number of total teachers.

In addition, for already accredited courses, the number of teachers has to increase proportionally to the number of students enrolled if this exceeds the thresholds established by law (Annex D, M.D. No. 1154/2021).

For online courses, legislative indications require a lower number of teachers, probably considering a reduced commitment for the teacher (to verify!), supported by tutors (disciplinary, guidance or technical).

However, if the courses reach high enrollment numbers (and this may happen in an online course where there are no constraints of classroom dimensions for universities and participation constraints for users), the number of faculty has to increase.

Table 5 - Results from periodic assessment by ANVUR for 80 traditional (public and private) and online universities (11).

Universities	**Positive**	**Fully Satisfactory**	**Satisfactory**	**Conditional**	**Total**
Final Score (*fs*)	$fs \geq 7.5$	$6.5 \leq fs < 7.5$	$5.5 \leq fs < 6.5$	$4 \leq fs < 7.5$	$fs < 4$
Traditional	7 (9%)	30 (38%)	42 (53%)	1 (1%)	80 (88%)
Online	0 (0%)	1 (9%)	8 (73%)	2 (18%)	11 (12%)
Total	7 (8%)	31 (34%)	50 (55%)	3 (3%)	91 (100%)

Table 6 - Number of teachers in traditional, blended and online degree courses (Annex A, M.D. No. 1154, 2021).

	Traditional o blended courses		**Mainly or fully online degree courses**		
Courses	Teachers	Tenured teachers	Teachers	Tenured teachers	Tutors (on subject)
Bachelors' degree	9	5	7	3	3 (2)
Masters' degree	6	4	5	2	2 (1)
Five year degree	15	8	12	5	5 (3)
Six year degree	18	10	-	-	-

At the national level, the whole number of in-service faculty members has gone from 57,305 at the end of 2012 to 61,099 in the year 2022 (+6.6 percent) according to the latest ANVUR data (2023a); 57,115 professors are employed at public universities (93.5 percent of the total); 3,402 professors at private universities (5.6 percent); 582 professors at online universities representing 1 percent of the total.

Ministerial data show that the percentage of contract faculty for public universities in 2022 is 23.3 percent, for private (online or traditional) 70.2 percent (https://ustat.mur.gov.it/dati/didattica/italia/atenei).

The most recent available data, collected from the service platforms of Italian Ministry of education and merged in the last column of Table 2, shows that there were 3639 faculty members at online universities in total in 2022. Tenured professors (582, as just said) account for only 16 percent of the total faculty at online universities. The remaining positions (3057) are covered by contract teachers, of whom 665 (18 percent) are professors from other universities, a higher number than tenured faculty.

Our research, aimed at analyzing the enrollment trend in Italian online universities, started from the analysis of the distance education practices and focused on the diffusion of online and open universities and the trends of enrollments to online courses in most populous countries of the world and Europe. We have presented in more detail the eleven Italian online universities established since 2004, their features, and courses, with particular attention to the process of quality assurance in the Italian system involving criteria on universities, courses, research, and teaching.

In the next Section, we describe the dataset and list the research questions that guided our study. Section 3 presents the results of our analysis considering enrollment trends according to gender, subject areas of degree programs, and geographic origins of enrolled students. Section 4 contains the discussion and conclusions of the research.

2. Materials and Methods

2.1 Data

We have collected data related to enrollments in bachelor's (Laurea Triennale in Italian) and master's (Laurea Magistrale in Italian) degree courses from the National Student Registry provided by the Italian Ministry of Universities through the OPENDATA service of the USTAT portal (https://ustat.mur.gov.it/).

Table 7 lists the datasets used with a short description and the variables recorded. The datasets, also analyzed in a previous study (Minerva et al., 2022), referred to the academic years from 2000/2001 to 2021/2022 (in the text, we use the beginning year to indicate the academic year, aka: 2004 refers to the 2004/2005 academic year; 2010 refers to 2010/2011, and so on). Some datasets start from 2010, and dataset X14 containing more information reaches only 2020.

Checking data consistency, we observed an underestimation of enrollments in online universities for the last academic year in the dataset, 2021/2022, due to different methods of enrollment in these entities where students can enroll during the whole year differently by "traditional" universities where the enrollments usually stop on November. By contacting the statistics offices of the online universities, we could add 59,713 students missing from the official data.

So, the number of records in the whole dataset, updated to December 6th, 2022, is just over 550,000.

For the analysis in this study, we used data starting from 2004, when the first online universities were established after the M.D. of April 17th, 2003.

A complete list of public, private, and online universities in Italy can be found in Tables 8 and 9. In particular, Table 8 presents the classification of public universities in the three geographical macro-areas into which Italy is usually divided: North, Centre, and South.

Table 7 - List and description of datasets used in the study retrieved from USTAT portal.

Dataset	Description	Academic years	Variables
X02	Enrolled by University	2000-2001 to 2021-2022	Universities, Male students, Female students
X03	Enrolled by Disciplinary Group	2000-2001 to 2021-2022	Subject groups of degrees, Male students, Female students
X06	Enrolled by Age	2010-2011 to 2021-2022	Students' birth year, Male students, Female students
X07	Enrolled by Residence	2010-2001 to 2021-2022	Residence province, Male students, Female students
X14	Enrolled by Residence, University, Group	2010-2011 to 2020-2021	Residence province, University, Subject groups of degrees, Enrolled students

Table 8 - Public universities divided by macro-regional areas (*names in Italian*).

* The Free University of Bozen-Bolzano and the University of Aosta, although not state universities, have been included among the public ones as they directly controlled by the local autonomous public institutions.
** Abruzzo and Molise (and the universities in the regions) have been classified as regions of Central Italy (from a geographical point of view) even though ISTAT classifies them as being in South Italy (from a socio-economical point of view).

Macro-area	Regions	Public universities	#
North	Valle d'Aosta, Piemonte, Lombardia, Trentino Alto Adige, Friuli Venezia Giulia, Veneto, Liguria, Emilia Romagna	Aosta*, Bergamo, Bologna, Bolzano*, Brescia, Ferrara, Genova, Milano Statale, Milano Bicocca, Milano Politecnico, Modena e Reggio Emilia, Padova, Parma, Pavia, Piemonte Orientale, Torino, Torino Politecnico, Trento, Trieste, Udine, Varese e Como Insubria, Venezia Ca' Foscari, Verona	23
Center	Toscana, Umbria, Marche, Lazio, Abruzzo**, Molise**	Camerino, Cassino e Lazio Meridionale, Chieti e Pescara, Firenze, L'Aquila, Macerata, Politecnica delle Marche, Molise, Perugia Stranieri, Roma Foro Italico, Roma La Sapienza, Roma Tor Vergata, Roma Tre, Pisa, Siena, Perugia, Siena Stranieri, Teramo, Tuscia, Urbino	20
South and regional Islands	Campania, Puglia, Basilicata, Calabria, Sicilia, Sardegna	Bari, Bari Politecnico, Basilicata, Cagliari, Calabria, Catania, Catanzaro, Foggia, Messina, Napoli Federico II, Napoli L'Orientale, Napoli Parthenope, Napoli Vanvitelli, Palermo, Reggio Calabria Mediterranea, Salento, Salerno, Sannio, Sassari	19

Table 9 - List of online and private universities.

	Universities	#
Online universities	Benevento Giustino Fortunato, Chieti Leonardo da Vinci, Firenze IUL, Napoli Pegaso, Novedrate e-Campus, Roma Mercatorum, Roma Marconi, Roma San Raffaele, Roma Niccolò Cusano, Roma UniNettuno, Roma UniTelma	11
Private universities	Bra' Scienze Gastronomiche, Casamassima LUM Degennaro, Castellanza LIUC, Enna Kore, Milano Bocconi, Milano Cattolica, Milano IULM, Milano San Raffaele, Napoli Benincasa, Reggio Calabria Dante Alighieri, Roma Campus Biomedico, Roma Europea, Roma Link Campus, Roma LUISS, Roma LUMSA, Roma Saint Camillus, Roma UNINT, Rozzano (MI) Humanitas	18

2.2 Methods

The descriptive and exploratory analysis presented here compares time series on student enrollments in Italian online universities by total, gender, fields of study, and geographical areas of origin (residence).

The study's main objective is to analyze the development of student enrollment in Italian online universities with respect to the national university system.

In particular, the analysis tried to reply to the following research questions:

1. what has been the enrollment trend in Italian online universities since their establishment?
2. what is the enrollment trend in online universities in terms of gender and disciplinary areas?
3. what are the enrollment rates in Italian online universities in terms of students' geographical areas of residence?

The study focused on the number of enrolled students in online universities. We compared those values with the general population of Italian academic students to detect to what extent this phenomenon is affecting the national educational system.

The analysis was conducted in the R v.4.2.1 environment using a computational Linux Ubuntu 20.0.4 server with an RStudio Server interface.

A complete and dynamic visualization of data realized using Flourish can be found at URL: https://public.flourish.studio/story/2137357/

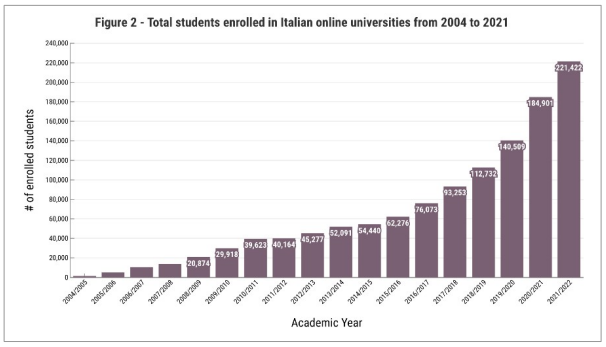
3. Results

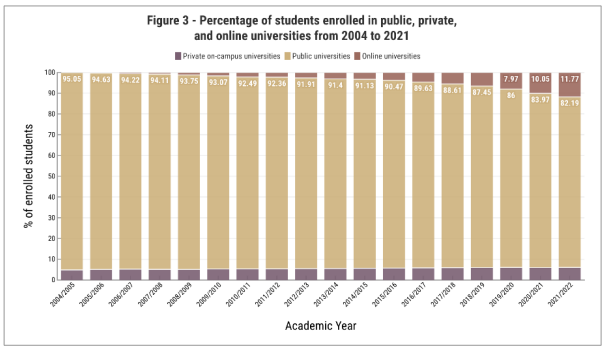
This section describes the main results of the analysis following the three research questions previously listed.

Q1 - What has been the enrollment trend in Italian online universities since their establishment?

Figures 2 and 3 show the progressive increase in enrollments of students in online universities since their establishment which, after the M.D. in 2003, became effective in 2004-2006 as said. In the academic year 2021/22, students enrolled in online universities accounted for almost 12 percent of the total number of university students in Italy, more than 220 thousand.

While the percentage of students enrolled in private universities has remained almost stable over the years, the percentage of students enrolled in online universities has gradually increased at the cost of public universities.

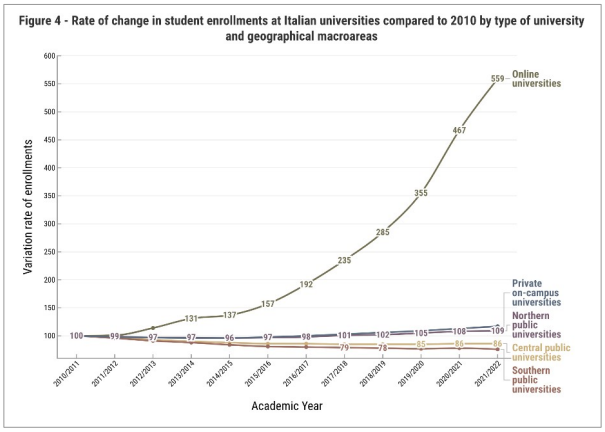


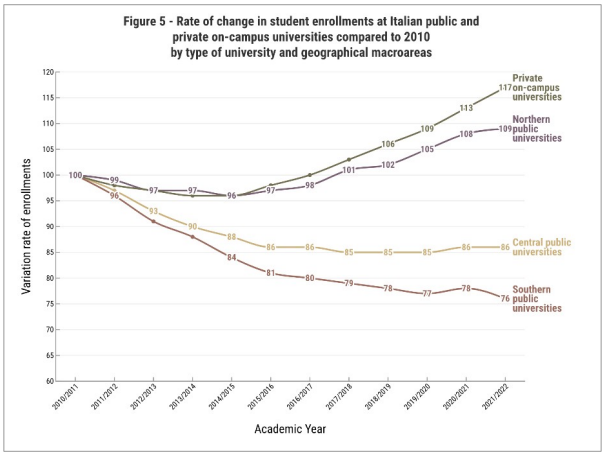


Figures 2 and 3 - Students enrolled in Italian online universities from 2004 to 2021.

Taking 2010 enrollment as a reference, private universities, both online and on-campus, see increases in student numbers compared to public universities (Figures 4 and 5). Online universities have quintupled their enrollment numbers over the past decade. The rate of change stands at 559 percent. More moderately, private on-campus universities have improved their recruitment by 17 percent.

Enrollments at public universities follow different trends depending on their geographical location. Universities in Central Italy have seen a loss of 14 percent since 2010; even worse, universities in the South have a 24 percent loss rate. By contrast, universities in the North are holding up. After a slight decrease until 2015/2016 shared by private on-campus universities, they have grown by 9 percent.





Figures 7 and 8 - Students enrolled online Italian universities by university location and kind from 2010 to 2021.

Figures 6 and 7 depict, in particular, the enrollments in each of the eleven Italian online universities.

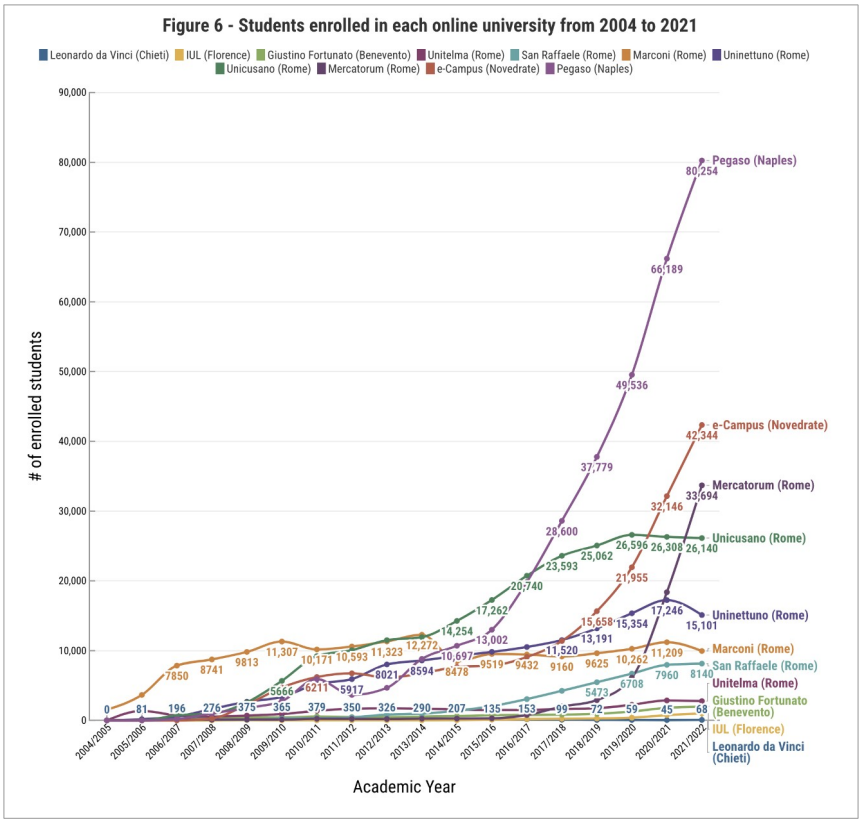
We can divide them into four categories according to the number of students in 2021:

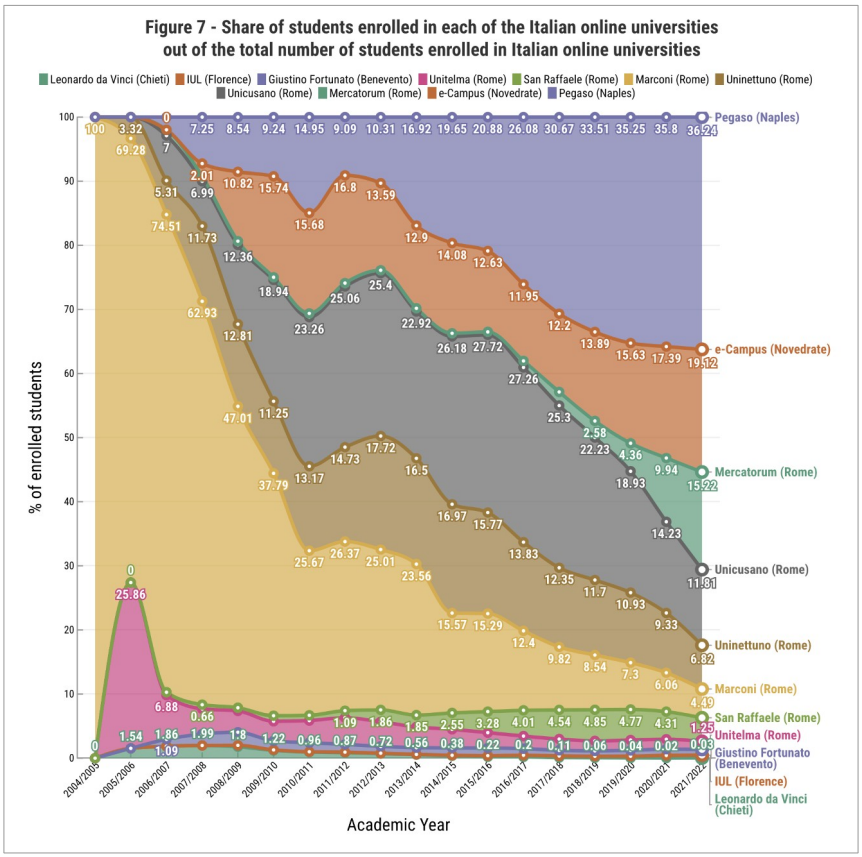
- *small* universities, till 10 thousand students;
- *medium* universities, between 10 and 20 thousand;
- *big* universities, between 20 and 40 thousand;
- *mega* universities, over 40 thousand.

Online universities of *small* dimension, till 10 thousand students, are six and together capture 10.8 percent of enrollment:

- Leonardo da Vinci, as said the smallest one, has less than one hundred enrolled students since its inception.

- IUL has around 1,000 students enrolled in degree courses, more than doubled in the last two years.





Figures 6 and 7 - Students enrolled in each online university from 2004 to 2021.

- Giustino Fortunato doubled enrollments in the last four years: without decreasing, it gathered 1,962 students in 2021, representing 0.9 percent of those enrolled in online universities.

- Unitelma, stable over the past year with previous incremental increases, collects less than 3 thousand students, covering 1.2 percent of enrollments of total online universities.

- San Raffaele counts 8,140 students, 3.7 percent of enrollments in online universities after achieving significant growth between 2015 and 2020.

- Marconi had a fluctuating trend in enrollment, with two peaks in 2013 and 2019-2020. In 2021, it collected about 9 thousand students (4.5 percent).

The only university of *medium* dimensions with around 15 thousand students is Uninettuno.

Cusano and Mercatorum are the two universities of *big* dimensions with, respectively, 26 and 34 thousand enrollments (11.8 and 15.2 percent of total).

Cusano has roughly stable enrollment numbers as of 2018 after experiencing a substantial growth phase from 2014.

On the contrary, Mercatorum is the university with the highest enrollment increases as Pegaso and e-Campus (*mega* universities). Suffice it to say that it doubled enrollments in one year and quintupled in the last two years.

Pegaso, which had an impressive growth rate since 2015, covers 36 percent of online university enrollment in Italy, with 80,000 students in 2021. It is followed by e-Campus, which gained 20 thousand new enrollments in two years, doubling the number of students to 42,344. Together they gather 122 thousand students, 55 percent of students enrolled in online universities.

All online universities have seen an increase in enrollment since their opening except for Marconi, which has a less stable trend, and Uninettuno, which has lost students in the past year.

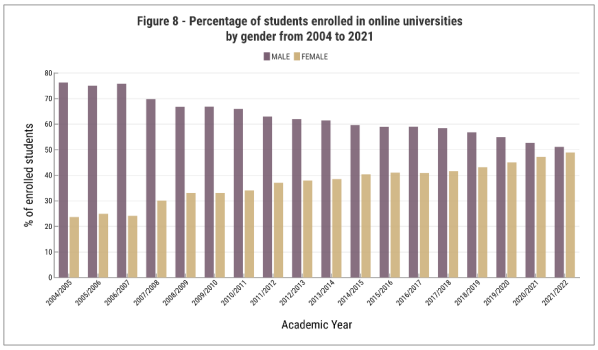
Q2. What is the enrollment trend in online universities in terms of gender and disciplinary areas?

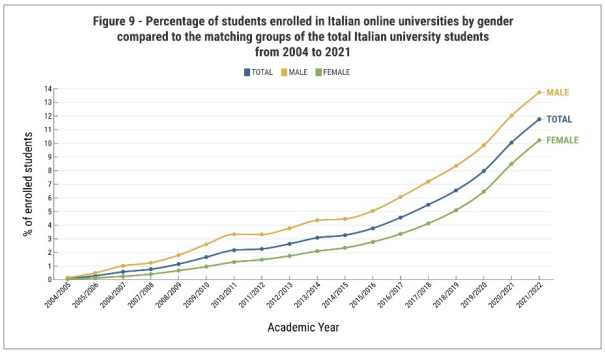
Gender

Since 2004, the prevalence of enrolled students has been men.

The trend has changed over the years, reaching a tie. In 2021, the percentages of men and women enrolled in online universities equalized (Figure 8).

If, on the other hand, we look at the percentages of enrollment in online universities compared to the total number of Italian students (Figure 9), it appears that the number of men is and has been – in past years – overrepresented compared to women who are however more numerous in Italian universities (in 2021: women, 1,063 thousand; men, 819 thousand).

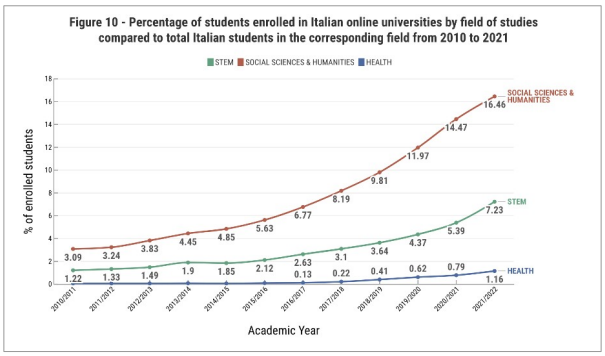




Figures 8 and 9 - Students enrolled in Italian online universities by gender from 2004 to 2021.

Disciplinary areas

Compared to students enrolled in the entire university system, the most represented subject area is Social Sciences and Humanities, where those enrolled in online universities correspond to 16.5 percent of total enrollments. These sectors are followed by Stem and Health, with 7.2 percent and 1.2 percent, respectively (Figure 10).



Figures 10 - Students enrolled in Italian online universities by degree subjects from 2010 to 2021.

As seen in Figures 11A and 11B, in 2021, the following fields are particularly overrepresented: Sport Sciences (43.5 percent), Psychology (31.6 percent), Education (21.1 percent), Law (19.1 percent), and Economics (15.3 percent).

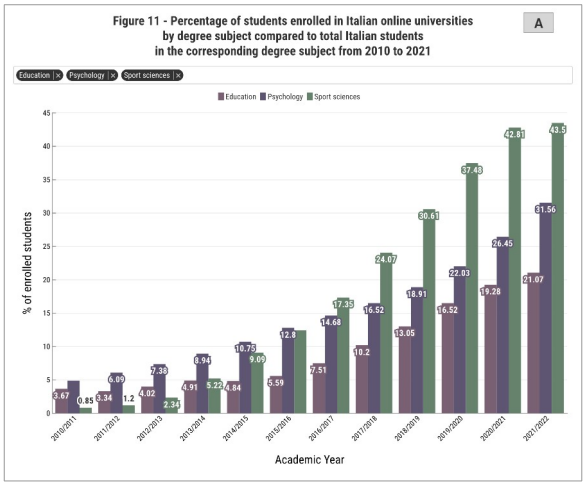
The more underrepresented fields (Figure 11E) are Science (3.7 percent), Medicine (1.2 percent), and Computer Science and ICT (0.0 percent).

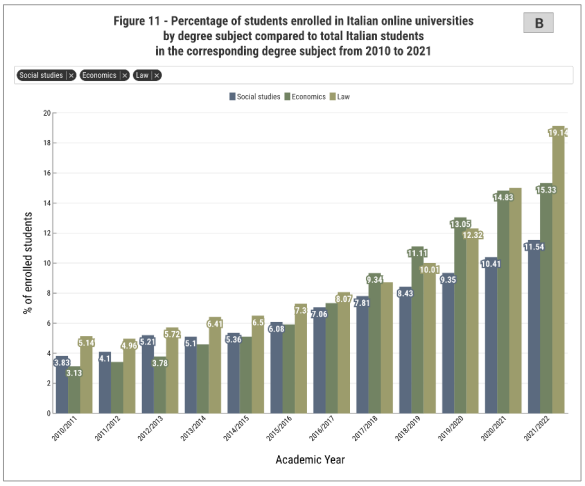
This situation has remained relatively stable since the launch of online universities.

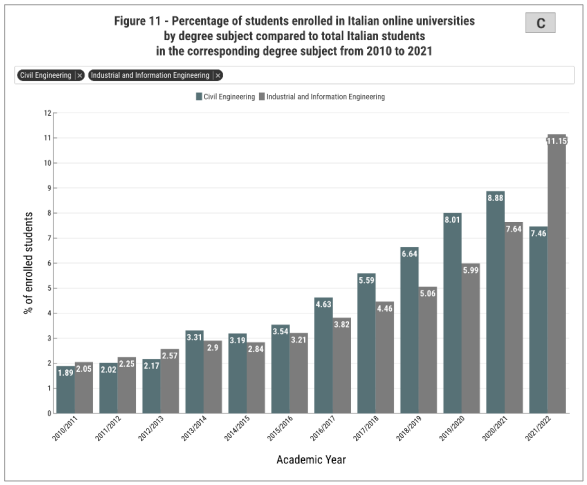
In fact, over the years since 2010, the Social Sciences area has always been the most represented, followed by Engineering (Figure 11C), Humanities (Figure 11D), and, finally, Agriculture, Science, Medicine, and Computer Science (Figure 11E).

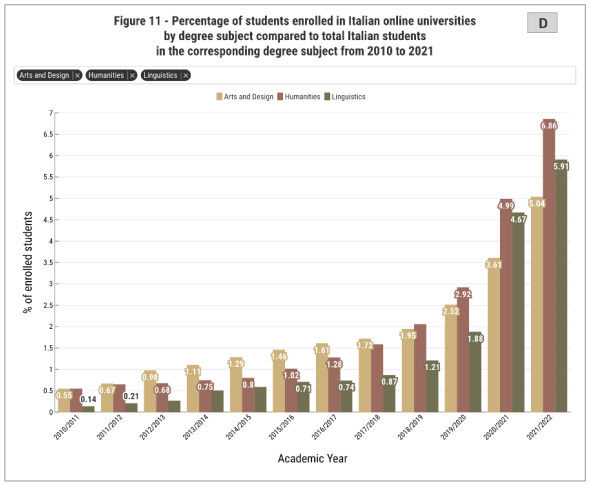
In the Social Sciences area, Psychology has prevailed since 2011 without change.

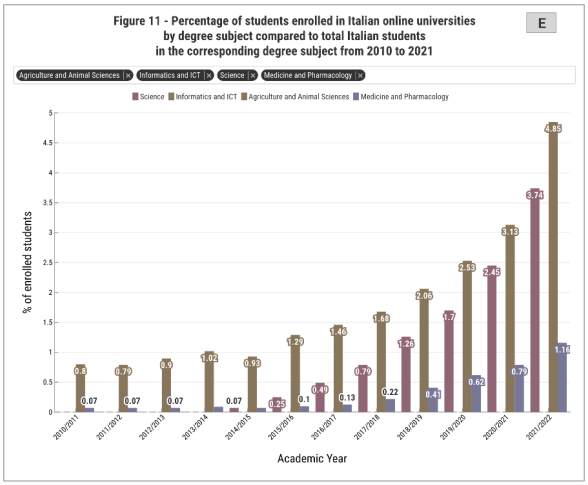
The Sport Sciences area has risen to the pole position since 2016.











Figures 11A/E - Students enrolled in Italian online universities by degree subjects from 2010 to 2021.

Q3. What are the enrollment rates in Italian online universities in terms of students' geographical areas of residence?

Figure 12 shows that enrollments in online universities are increasing from all three geographical areas. Students from Southern Italy are the most numerous, followed by those from the North, which in the last three years have taken second place from students from the Center. In fact, since 2019 students from Northern Italy have increased by +30 thousand enrolled, compared to +26 thousand from the South and only +17 from the Center.

Confirmation comes to us by looking at the percentages (Figure 13): Southern Italy is the primary geographic area of students enrolled in online universities. Over the years, students residing in the South have accounted for roughly half of those enrolled in online universities. Since 2020 they have lost some amount to students residing in the North. The latter, that until 2017 was stable at around 23 percent, since 2018 has started to increase. On the contrary, the percentage of students from the Center is slowly decreasing.

Our analysis also compared the number of students enrolled in online universities with the total number of academic students in the same geographic areas (Figure 14).

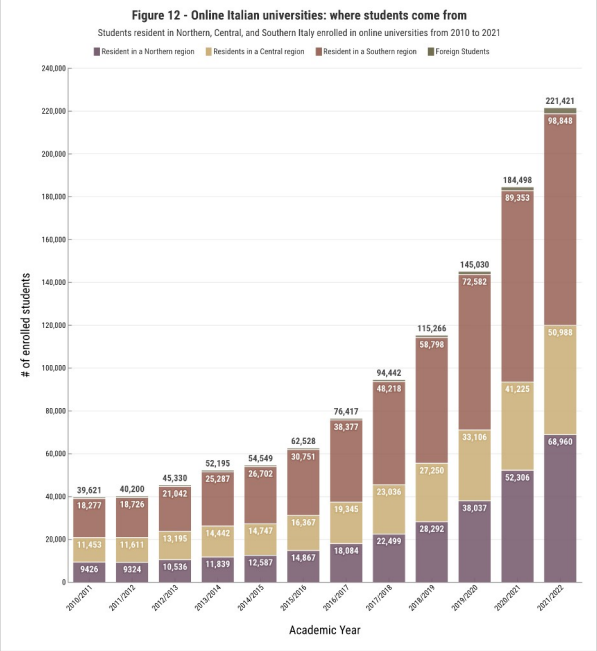
In all three macroareas, there has been a continuous increase since 2010. In the Center and South Italy, there were similar percentages of students enrolled in online universities compared to those enrolled in the national academic system between 2010 and 2012. Even in this comparison, it appears that the percentage of enrollments of students from the South is increasing steadily, that of students from the Center has slowed down, and that of students from the North is slowly growing with rising rates of increase in the last years.

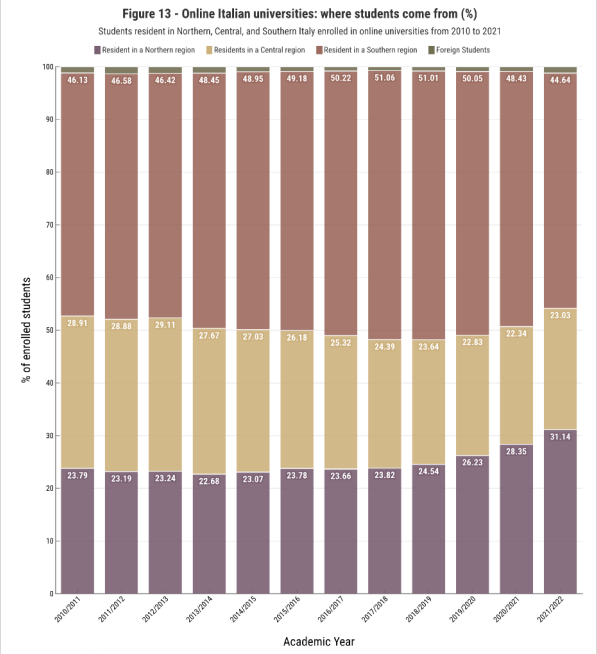
A focus on the regions and provinces into which the macroareas are divided follows.

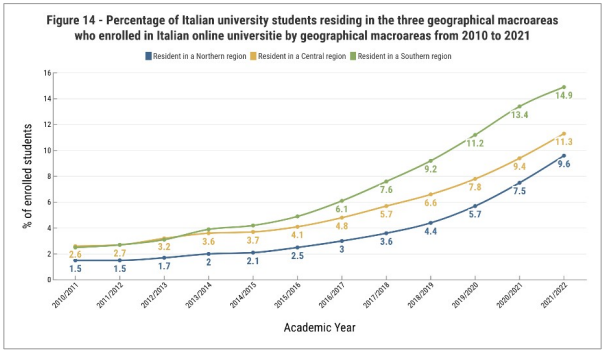
Figures 15 and 16 focus on the percentage of students enrolled in online universities by region.

In 2021, the first positions of the list of (20) regions with the high percentage of students enrolled in online universities were occupied by the regions of Southern Italy, in particular, Calabria (17.4 percent), Sicilia (16.6), Campania (15.6). The percentage of enrollment in Sardegna is unexpected compared to that of Sicilia: the two Italian islands have different trends. Sardegna, in fact, has half of the students from Sicilia enrolled in online universities (only 8.7 percent).

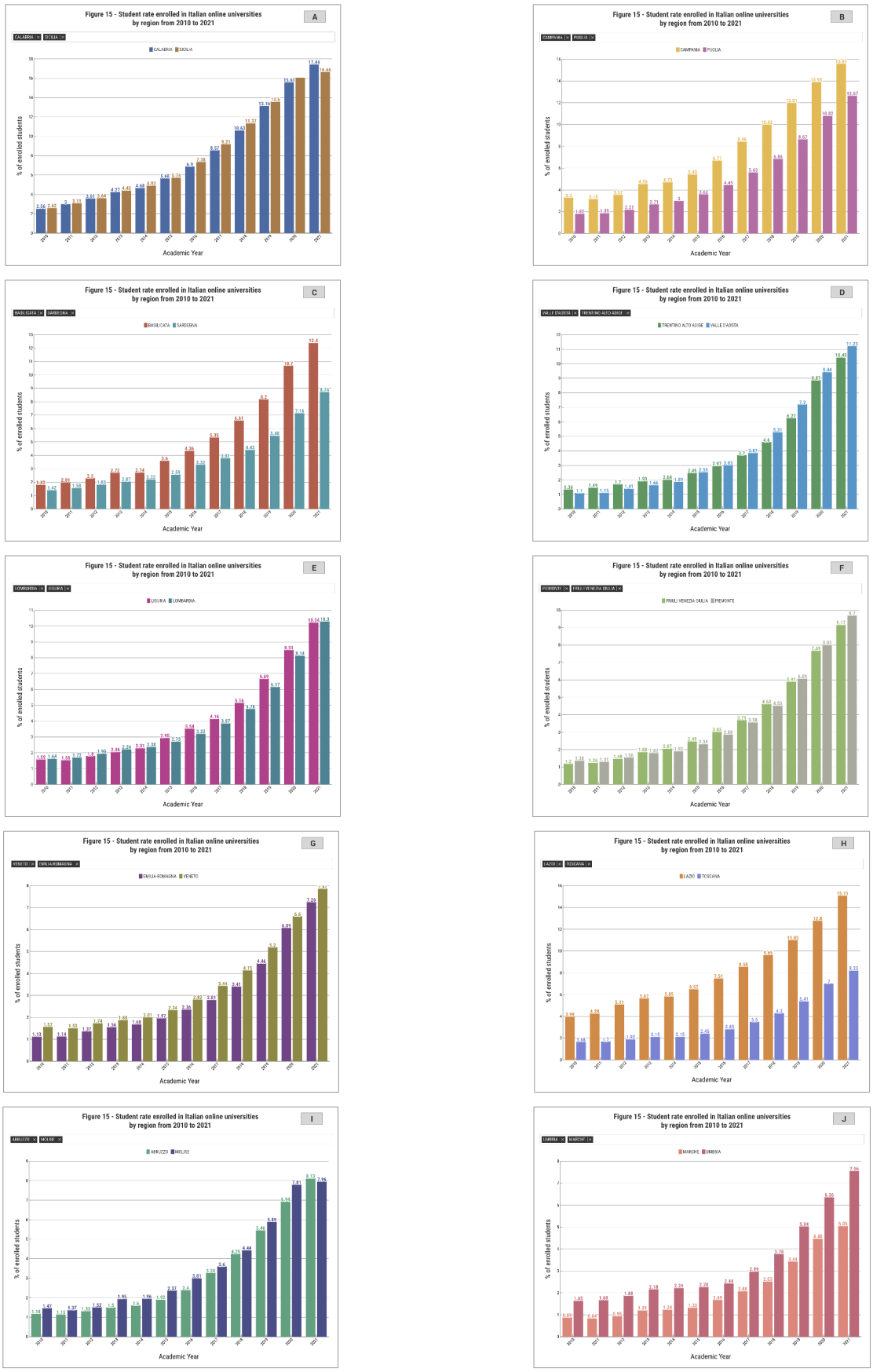
Among the Central regions, Lazio stands out with a rate of enrollment of 15.1 percent. Valle d'Aosta (11.2 percent), Lombardia (10.3 percent), and Trentino (10.5 percent) are the regions of the North area that have higher enrollment percentages, although lower than those of most of the Southern regions.







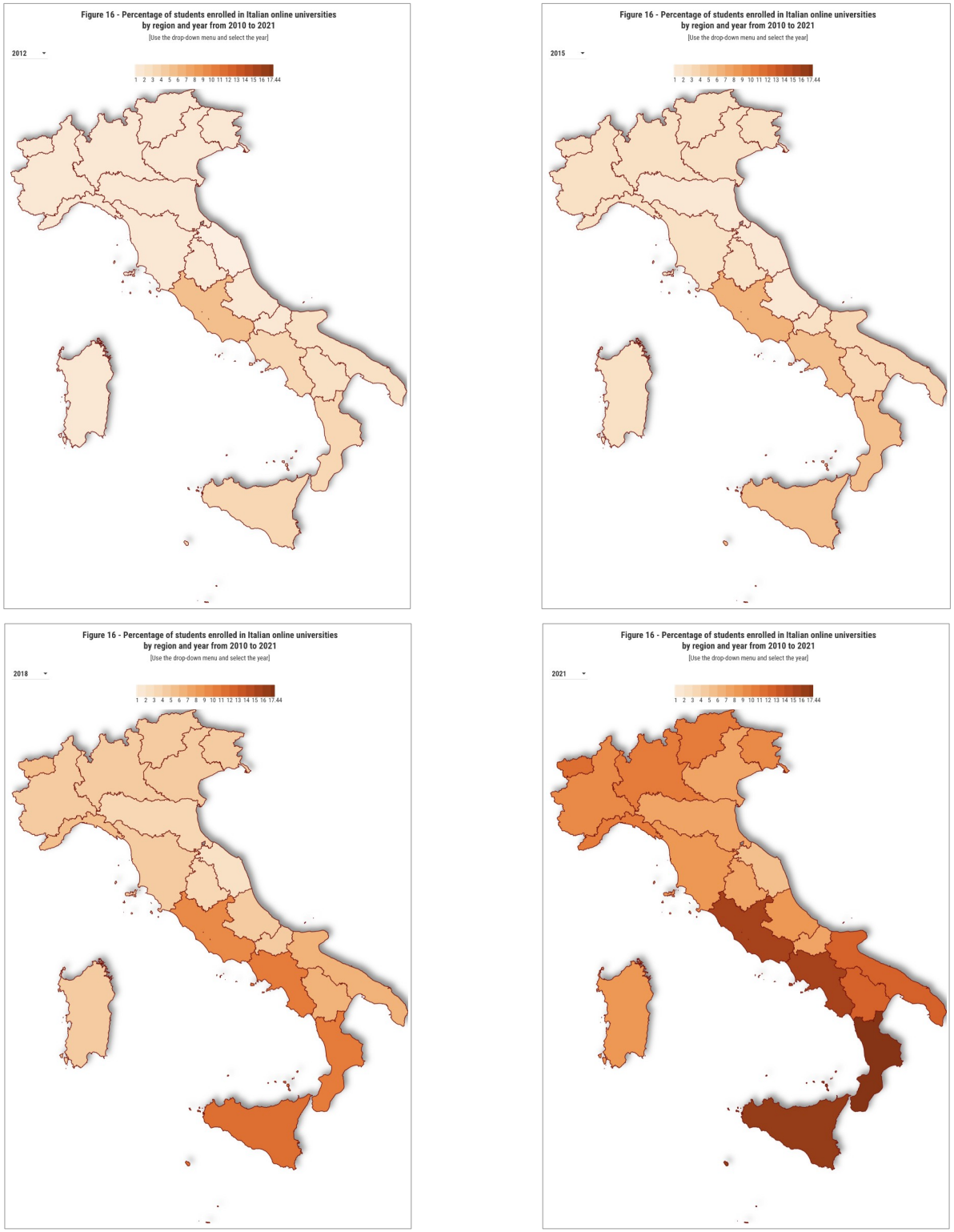
Figures 12, 13 and 14 - Enrollments in Italian online universities based on students' residence from 2010 to 2021.



Figures 15A/J - Students enrolled in Italian online universities by region from 2010 to 2021 (A/C = South, D/G = North, H/J = Center).

Marche, a Central region, is the one that, since the first years, occupies the last position of the list of regions with 5.1 percent of the enrollments in 2021.

From 2010 to the present, the percentages have increased in each region, leaving the ranking by macro-areas almost unchanged and testifying to a phenomenon that is increasingly rampant in the South, growing in the North, and more contained in the Central regions.



Figures 16 - Students enrolled in Italian online universities by region and year (2012, 2015, 2018, 2021).

The rates of students enrolled in online universities by (107) provinces broadly mirror the situation by regions with some exceptions.

In 2021, the top thirty provinces with higher percentage of enrollments in online universities belong to the South area or Lazio (Central Italy). Some examples in Figures 17A, B, C are Trapani and Caltanisetta, Sicilia (23.8 and 20.0); Reggio Calabria and Crotone, Calabria (22.2 and 22.0); Benevento, Campania (21.9); Latina, Lazio (17.5).

Among the highest percentages, we find three border provinces from the Northern area with percentages that exceed the regional ones (Figures 17D, E, F): Verbano-Cusio-Ossola, Piedmont (20.0 percent); Imperia, Liguria (15.6 percent), Bolzano, Trentino (15.2 percent).

To confirm the rates by area and by region (Figures 17G and H), the provinces of Marche have lower percentages of enrollments: Fermo (5.2), Ancona (5.0), Macerata (4.5), and at last Pesaro-Urbino (4.4).

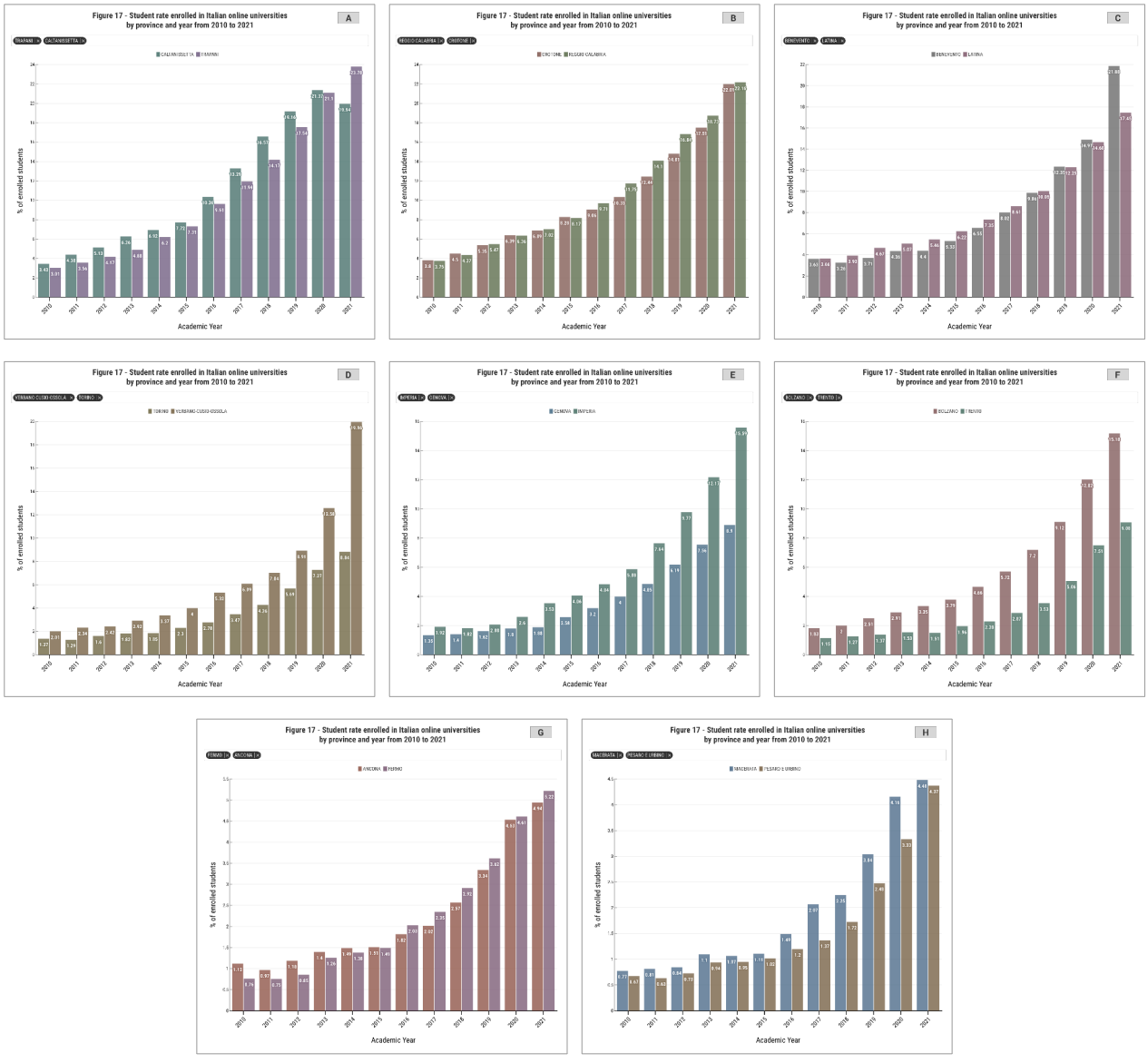
Let us take as a reference the lowest value recorded in 2021 for a province (4.4) and compare it with the previous ten years (Figure 17).

In 2018, the provinces with a higher enrollment percentage than 4.4 were 61 from the regions of the three geographic macro-areas.

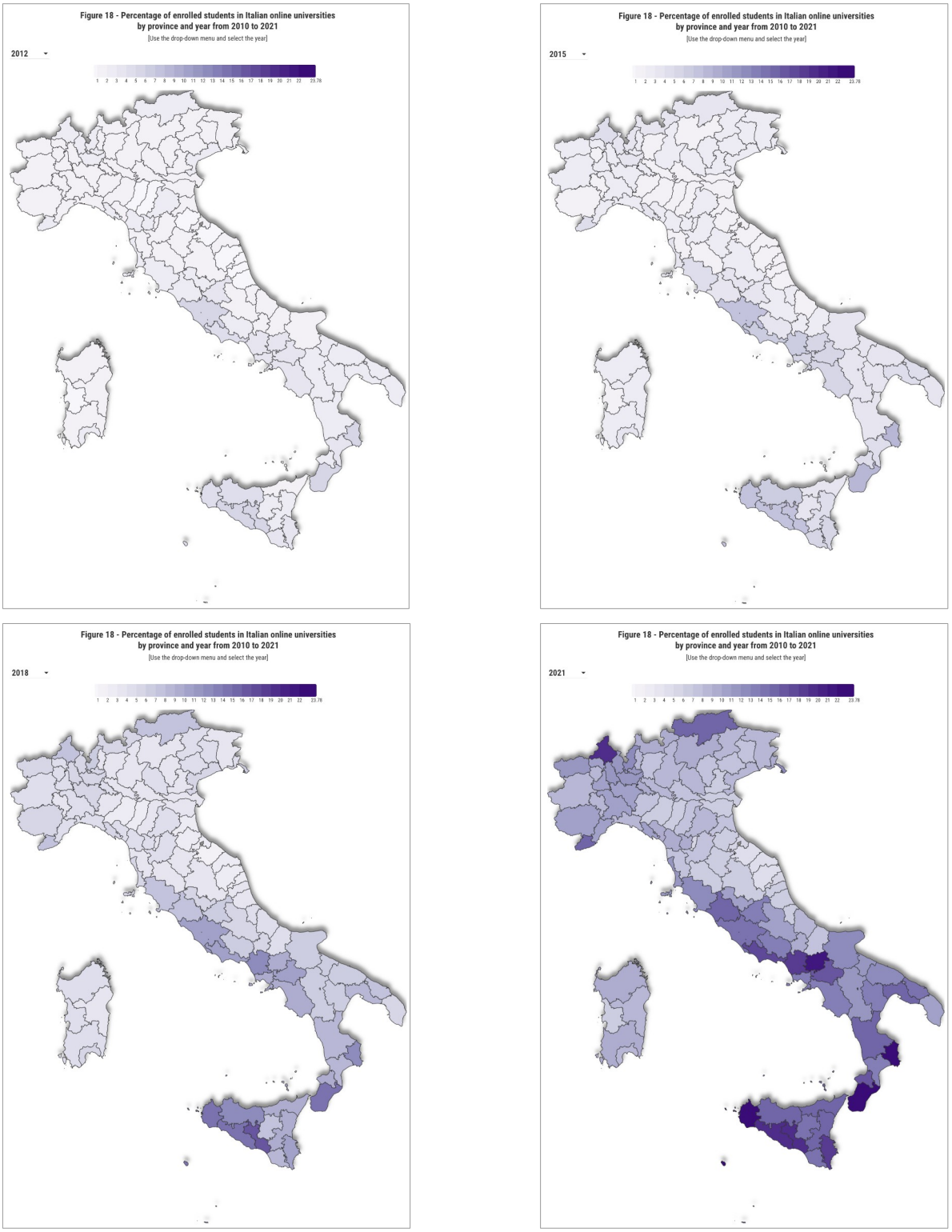
In 2015, the provinces with a percentage of enrollment higher than 4.4 were 17 and belonged to the regions of Calabria, Sicily, Campania, and Lazio.

In 2010, the only province with a similar percentage than this was Rome, Lazio (slightly above the order of hundredths, 4.37 vs 4.44).

Within ten years, the maximum value turned into the minimum, demonstrating the power of a phenomenon spreading to the entire country.



Figures 17A/H - Students enrolled in Italian online universities by province from 2010 to 2021.



Figures 18 - Students enrolled in Italian online universities by province and year (2012, 2015, 2018, 2021).

4. Discussion and Conclusions

In our previous analysis on time series in enrollments to Italian universities (Minerva et al., 2022), we identified some dynamics emerging in the last 20 years:

- increase in enrollments in online and private universities;
- increase in enrollments at universities in the North;
- decrease in enrollments at universities in the Center and South;
- increased migration of Southern students to online universities.

We continued investigating how this scenario is shaping up in our national context.

We were able to add more findings to what we had already deduced before:

- except for Marconi and Uninettuno, all online universities have stable or increasing enrollment numbers, even though they belong to the category of small universities. Launched between 2004 and 2006, the percentage of enrollments is now seeing a dramatic increase. Taken together, all the online universities gather more than 221,000 students; in particular, Pegaso and e-Campus account for 55 percent of the enrollments. Mercatorum, which had low numbers until 2018, is following an upward trend.
- Social Sciences and Humanities is the field of study most affected by enrollment in online universities. Sport Sciences, Psychology and Education are the areas in which enrollment in online universities has a higher percentage than the total number of enrollments in Italian universities. The more underrepresented fields are Science, Medicine, and Computer Science/ICT. An explanation of this rate is that M.D. 289/2021, Appendix D prevents courses in the medical, health, and architecture area and requiring special laboratory activities from being conducted in a telematics mode.
- more men enrolled in online universities in the first years after their launch. Nowadays, the proportions of women and men are equal. Men are still overrepresented if compared to total enrollments in Italian universities.
- students from South Italy, Lazio, and then North are the most likely to enroll in online universities. Compared to the other geographical macro-areas, the percentage of students from the Center making this choice is decreasing. Enrollment data are not sufficient to explain the regional effects and the motivations behind students' choices. Further investigations are needed.

Table 10 depicts the Italian university system scenario that compared the most recent data. The percentage of traditional and online universities overlaps those of the enrollments. Compared to traditional universities, the percentage of courses and teachers is very low, showing the presence of few courses with very high student numbers and a faculty composed mostly of contract teachers.

Table 10 - Universities, courses, enrollments and teachers in Italian university system.

Universities	Number	Courses (a.y. 2023/24)	Enrollments (a.y. 2021/22)	Tenured teachers (2022)
Traditional (public and private)	80 (88%)	5,090 (97%)	1,660 thousand (88%)	60,517 (99%)
Online	11 (12%)	155 (3%)	220 thousand (12 %)	582 (1%)

Despite this, online universities are replying to training needs that the traditional educational system is unable to satisfy. An increasing number of students are choosing private universities and their online training solutions.

Among the online universities, we reported three cases in which public universities support private online ones (Leonardo da Vinci, IUL, and Unitelma), in order to offer a broader range of courses. These institutions remain among those with lower student numbers (*small* universities).

There are, however, several elements that distinguish public universities from online ones and that can encourage enrollment in online universities:

- distance education and the provision of asynchronous activities increase autonomy and personalization of learning times, enrollment, and plans. This solution adapts to the needs of adult students, workers, students with disabilities, but also young students;
- enrollments are open throughout the whole year in most cases (sometimes with discounts or special offers), differently from public universities where they are available in a specific period, between July and November;
- online universities often have (many) locations throughout the country where information and examinations can be taken without the need to move;
- personalized tutoring activities for students are promoted at online universities;
- many degree courses are open access, unlike some at public universities;
- numerous short and single courses solutions are offered.

One possibility for developing online courses and introducing digital innovation in public universities is currently represented by the actions promoted by the

Decree n. 983 del 24.07.2023 that has recently been published within the actions of the National Recovery and Resilience Plan (NRRP), part of the European program Next GenerationEU and, in particular, in Mission 4 dedicated to Education and Research.

It promotes the establishment of three Digital Education Hubs (DEHs) in the country (two in the North-Central area and one in the Southern). The DEHs are conceived as networks of universities (including also those private) that work together to reinforce the higher education system and offer digital education to students, professionals, and enterprises in order to create pathways for flexibility and inclusion. The program supports the diffusion of MOOC (Massive Open Online Courses) and micro-credentials, the creation of inter-universities training solutions and digital platforms. An important action goal is to increase the number of graduates in Italy. The country, in fact, is second to last in the ranking of European countries by the number of graduates followed only by Romania (Tertiary education, ISCED 2011, 5-8 levels). The percentage of Italian graduates (Figure 19) is very low if compared to European percentage, respectively 18.1 percent (Italy) and 30.2 (Europe) in 2022.

Similarly, the percentages of university dropouts in Italy and those aged 18-24 who are not engaged in study and work (NEET) remain worrisome (ANVUR, 2023a).

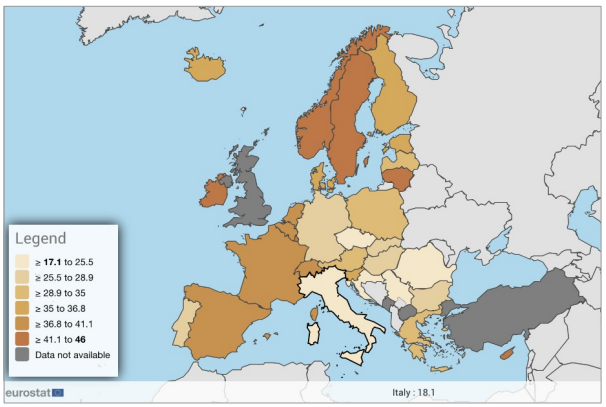


Figure 19 - Percentage of graduates in European countries (Eurostat, 2023).

Digital education, focusing on teaching quality and technological innovation, may be one of the possible ways to invest in and improve the tertiary education system in Italy.

Notes

According to CRediT system: Tommaso Minerva: Conceptualization, Methodology, Software, Project Administration; Annamaria De Santis: Resources, Writing - Original Draft, Writing - Review and Editing, Formal analysis, Data Curation, Visualization; Claudia Bellini: Resources, Writing - Original Draft, Writing - Review and Editing; Katia Sannicandro: Resources, Writing - Original Draft, Writing - Review and Editing.

References

ANVUR (2023a). *Rapporto Sul Sistema Della Formazione Superiore e della Ricerca*. Retrieved from https://www.anvur.it/wp-content/uploads/2023/06/Sintesi-Rapporto-ANVUR-2023.pdf

ANVUR (2023b). *Linee Guida per il Sistema di Assicurazione della Qualità negli Atenei*. Retrieved from https://www.anvur.it/wp-content/uploads/2023/02/AVA3_LG_Atenei_2023_02_13.pdf

ANVUR (2023c). *Linee Guida per la Progettazione in Qualità dei Corsi di Studio di Nuova Istituzione per l'a.a. 2024-2025*. Retrieved from https://www.anvur.it/wp-content/uploads/2023/10/Linee-Guida-Nuova-istituzione_2024_25_def.pdf

ANVUR (2023d). *Modello di Accreditamento Periodico delle Sedi e dei Corsi di Studio Universitari*. Retrieved from https://www.anvur.it/wp-content/uploads/2023/02/AVA3_Requisiti-con-NOTE_2023_02_13.pdf

Belawati, T. (2022). *Open and Distance Education in Asia. Good practices from AAOU members*. Universitas Terbuka Publisher.

Comitato nazionale per la valutazione del sistema universitario, CNVSU (2010). *Analisi della situazione delle Università Telematiche*. Retrieved from: http://www.cnvsu.it/_library/downloadfile.asp?id=11682

Consiglio Universitario Nazionale (2007). *Dossier CUN. Atenei telematici*. Retrieved from: https://www.cun.it/uploads/4082/dossier_cun_n.7_luglio_2013.pdf?v=

European Association for Quality Assurance in Higher Education (ENQA) (2005). *Standards and Guidelines for Quality Assurance in the European Higher Education Area*. Retrieved from https://www.ehea.info/media.ehea.info/file/ENQA/05/3/ENQA-Bergen-Report_579053.pdf

European Association for Quality Assurance in Higher Education (ENQA) (2008). *Implementing and Using Quality Assurance: Strategy and Practice*. Retrieved from https://www.enqa.eu/wp-content/uploads/2nd-Forum-Implement.-Using-QA_final-1.pdf

European Association for Quality Assurance in Higher Education (ENQA) (2015). S*tandards and Guidelines for Quality Assurance in the European Higher Education Area*. Retrieved from https://www.enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf

European Association for Quality Assurance in Higher Education (ENQA) (2020). *ESG 2015–2018 Enqa Agency Reports: Thematic Analysis*. Retrieved from https://www.enqa.eu/publications/esg-2015-2018-enqa-agency-reports-thematic-analysis/

Eurostat (2023). *Population by educational attainment level, sex and age (%) - main indicators*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/view/EDAT_LFSE_03/default/map?lang=en

Gaebel, M., & Morrisroe, A. (2023). *The future of digitally enhanced learning and teaching in european higher education institutions*. European University Association absl.

Gaebel, M., Kupriyanova, V., Morais, R., & Colucci, E. (2014). *Results of a Mapping Survey conducted in October-December 2013*. Brussels: Eua Publications.

Gaebel, M., Zhang, T., Stoeber, H. & Morrisroe, A. (2021). *Digitally enhanced learning and teaching in European higher education institutions*. European University Association absl.

Garavaglia, A., & Pasta, S. (2021). L'università a distanza: dalla Open University alla Legge Moratti-Stanca. In P.C. Rivoltella (Ed.), *Apprendere a distanza. Teorie e metodi* (pp. 33-48). Milano: Raffaello Cortina Editore.

Government of India, Ministry of Education (n.d.). *All India Survey on Higher Education 2020-21 (AISHE Final Report)*. https://aishe.gov.in/aishe/gotoAisheReports

Higher Education Statistics Agency, HESA (2023). *HE student enrolments by HE provider, location of study, country of HE provider, region of HE provider, level of study, mode of study and academic year*. Retrieved from https://www.hesa.ac.uk/data-and-analysis/students/table-60

Indira Gandhi National Open University, IGNOU (2022). *Annual Report 2021-22*. Chandu Press, Delhi.

Kentnor, H. E. (2015). Distance education and the evolution of online learning in the United States, *Curriculum and teaching dialogue*, *17*(1), 21-34.

Latchem, C. (2018). Australia. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and Distance Education in Australia, Europe and the Americas. National Perspectives in a Digital Age* (pp. 9-25). Singapore: Springer.

Li, W., & Chen, N. (2019). China. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and Distance Education in Asia, Africa and the Middle East. National Perspectives in a Digital Age* (pp. 7-23). Singapore: Springer.

McFarland, J., Hussar, B., de Brey, C., Snyder, T., Wang, X., Wilkinson-Flicker, S., Gebrekristos, S., Zhang, J., Rathbun, A., Barmer, A., Bullock Mann, F., & Hinz, S. (2017). *The Condition of Education 2017 (NCES 2017- 144)*. U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2017144

Minerva, T., De Santis, A., Bellini, C., & Sannicandro, K. (2022). A time series analysis of students enrolled in Italian universities from 2000 to 2021. *Italian Journal of Educational Research*, *29*, 9-22.

Ministerio de Educación,Cultura y Deporte (2012). *Datos y cifras del sistema universitario español. Curso 2012-2013*. Retrieved from https://www.universidades.gob.es/publicaciones-e-informes/

Ministerio de Universidades, Gobierno de España (2023). *Datos y cifras del Sistema Universitario Español. Publicación 2022-2023*. Retrieved from https://www.universidades.gob.es/publicaciones-e-informes/

Ministry of Education of China (2014). *Number of Students of Formal Education by Type and Level 2013*. Retrieved from http://en.moe.gov.cn/documents/statistics/2013/national/201412/t20141215_181593.html

Ministry of Education of China (2022). *Number of Students of Formal Education by Type and Level 2021*. Retrieved from: http://en.moe.gov.cn/documents/statistics/2021/national/202301/t20230104_1038067.html

Ministry of Education of China (2023). *Statistical report on China's educational achievements in 2022*. Retrieved from http://en.moe.gov.cn/documents/reports/202304/t20230403_1054100.html

Ministry of education of Korea (2023). *Education in Korea*. Retrieved from https://english.moe.go.kr/boardCnts/viewRenewal.do?boardID=282&boardSeq=95608&lev=0&searchType=null&statusYN=W&page=1&s=english&m=0502&opType=N

National Center for Education Statistics (2023). *Condition of Education*. https://nces.ed.gov/programs/coe/

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S. (2018). Online education: Worldwide status, challenges, trends, and implications. *Journal of Global Information Technology Management*, *21*(4), 233-241.

Patru, M., & Khvilon, E. (2002). *Open and distance learning: Trends, policy and strategy considerations*. France: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000128463

Prisloo, P. (2019). South Africa. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and Distance Education in Asia, Africa and the Middle East. National Perspectives in a Digital Age* (pp. 67-82). Singapore: Springer.

Qayyum, A., & Zawacki-Richter, O. (2018, Eds.), *Open and Distance Education in Australia, Europe and the Americas. National Perspectives in a Digital Age*. Singapore: Springer.

Qayyum, A., & Zawacki-Richter, O. (2019). The State of Open and Distance Education. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and Distance Education in Asia, Africa and the Middle East National Perspectives in a Digital Age*. Singapore: Springer.

República Federativa do Brasil (2023). *Censo da Educação Superior 2022. Notas Estatísticas*. Inep/MEC – Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira.

Roffe, I. (2004). *Innovation and e-learning: E-business for an educational enterprise*. Cardiff, UK: University of Wales Press.

Sursock, A. (2015). *EUA: Trends 2015: Learning and Teaching*. Retrieved from https://www.researchgate.net/publication/279950904_Trends_2015_Learning_and_Teaching_in_European_Universities

The World Bank (2023a). *School enrollment, tertiary (% gross) - Sub-Saharan Africa*. Retrieved from: https://data.worldbank.org/indicator/SE.TER.ENRR?locations=ZG

The World Bank (2023b). *Population ages 0-14 (% of total population) - Sub-Saharan Afric*a. Retrieved from: https://data.worldbank.org/indicator/SP.POP.0014.TO.ZS?locations=ZG

Zawacki-Richter, O., & Jung, I. (2023). An Introduction. In O. Zawacki-Richter & I. Jung (Eds.) *Handbook of Open, Distance and Digital Education* (pp.4-12). Singapore: Springer.

Laws and decrees

Directorial Decree No. 2711 of November 22, 2021. Original Italian reference: Decreto Direttoriale n. 2711 del 22-11-2021. Retrieved from https://www.mur.gov.it/sites/default/files/2021-11/Decreto%20Direttoriale%20n.2711%20del%2022-11-2021.pdf

Law no. 286 November 24, 2006. Original Italian reference: Legge n. 286 del 24 novembre 2006. Conversione in legge, con modificazioni, del decreto-legge 3 ottobre 2006, n. 262. Retrieved from https://www.gazzettaufficiale.it/eli/gu/2006/11/28/277/so/223/sg/pdf

Law no. 240 December 30, 2010. Original Italian reference: Legge n. 240 del 30 dicembre 2010. Norme in materia di organizzazione delle università, di personale accademico e reclutamento, nonché delega al Governo per incentivare la qualità e l'efficienza del sistema universitario. Retrieved from https://www.anvur.it/wp-content/uploads/2011/12/1.Legge240_2010.pdf

Legislative Decree No. 19 of January 27, 2012. Original Italian reference: Decreto Legislativo n. 19 del 27 gennaio 2012. Valorizzazione dell'efficienza delle università e conseguente introduzione di meccanismi premiali nella distribuzione di risorse pubbliche. Retrieved from https://www.anvur.it/wp-content/uploads/2017/04/dlgs_19_del_27_01_2012.pdf

Ministerial Decree of April 17, 2003. Original Italian reference: Decreto Ministeriale del 17 aprile 2003 - Criteri e procedure di accreditamento dei corsi di studio a distanza delle università statali e non statali e delle istituzioni universitarie abilitate a rilasciare titoli accademici. Retrieved from https://www.gazzettaufficiale.it/eli/id/2003/04/29/03A05400/sg

Ministerial Decree No. 6 of January 7, 2019. Original Italian reference: Decreto Ministeriale n. 6 del 7 gennaio 2019. Decreto Autovalutazione, Accreditamento Iniziale e Periodico delle Sedi e dei Corsi di Studio e Valutazione Periodica. Retrieved from https://www.anvur.it/wp-content/uploads/2019/02/DM-n.-6-del-7-gennaio-2019-versione-accessibile.pdf

Ministerial Decree No. 47 of January 30, 2013. Original Italian reference: Decreto Ministeriale n. 47 del 30 gennaio 2013. Decreto Autovalutazione, Accreditamento Iniziale e Periodico delle Sedi e dei Corsi di Studio e Valutazione Periodica. Retrieved from https://www.anvur.it/wp-content/uploads/2013/01/3.%20DM%2047_2013.pdf

Ministerial Decree No. 289 of March 25, 2021. Original Italian reference: Decreto Ministeriale n. 289 del 25 marzo 2021. Linee generali d'indirizzo della programmazione triennale del sistema universitario per il triennio 2021-2023. Retrieved from https://www.mur.gov.it/sites/default/files/2021-04/DecretoMinisterialen.289del025-03-2021.pdf

Ministerial Decree No. 635 of August 8, 2016. Original Italian reference: Decreto Ministeriale n. 635 del 8 agosto 2016. Linee generali d'indirizzo della programmazione delle Università 2016-2018 e indicatori per la valutazione periodica dei risultati. Retrieved from http://attiministeriali.miur.it/anno-2016/agosto/dm-08082016.aspx

Ministerial Decree No. 987 of December 12, 2016. Original Italian reference: Decreto Ministeriale n. 987 del 12 dicembre 2016. Decreto Autovalutazione, Accreditamento Iniziale e Periodico delle Sedi e dei Corsi di Studio e Valutazione Periodica. Retrieved from http://attiministeriali.miur.it/media/299066/dm_987_2016.pdf

Ministerial Decree No. 1154 of October 14, 2021. Original Italian reference: Decreto Ministeriale n.1154 del 14 ottobre 2021 - Autovalutazione, valutazione, accreditamento iniziale e periodico delle sedi e dei corsi di studio. Retrieved from https://www.mur.gov.it/it/atti-e-normativa/decreto-ministeriale-n1154-del-14-10-2021