800 1222·2022 ANNI

UNIVERSITÀ DEGLI STUDI DI PADOVA

T4L Report

Teaching4Learning

Teaching4Learning Office
Quality Assurance and
Innovative Teaching Sector

Teaching4Learning@Unipd

A success story that started far, far away...

Preface by

Daniela Mapelli
University of Padova Rector

Monica Fedeli
Vice-Rector for the Third Mission and Regional Relations

Looking back on Teaching4Learning (T4L), the University of Padova's professional and organisational development programme for its academic staff, we recall its beginnings and challenges, and how our teaching community's needs began to surface, triggering a snowballing demand for professional development.

T4L was launched in 2016 and is a tangible example of how a transformative model within a university environment can promote active teaching and improve the learning experience in degree-course classrooms. It is based upon European Commission recommendations (2011; 2013), which encourage universities to try out innovative teaching and student-centred learning strategies, de-privatise teaching, and develop communities of instructors that can reflect upon their teaching practices.

Today, it is clear that higher-education teaching has taken centre-stage at institutions across Europe (EC, 2011; 2013; EUA, 2019) and beyond, with focus being sharpest on certain key domains, such as the continuous development of teaching and learning competences; the certification and recognition of good teaching; cross-subject development of methodological approaches to support learners; and greater dialogue between students, instructors and institutions in a bid to design increasingly innovative curricula. These domains form a framework around which

shared teaching strategies can be devised along a two-tier open systems approach. The first tier looks outward, as interaction with stakeholders in the world of work can provide feedback that contributes significantly to designing new curricula and establishing practices that can be transferred into a classroom setting. The second looks inward, particularly at processes for de-privatising teaching that involve constructing a new teacher-training based habitus within universities, one that comprises peer observation and feedback; shared teaching practices and methods; time for colleagues from different faculties to interact and pinpoint transferable strategies; critiquing personal teaching/learning perspectives, as well as awareness of the dominant organisational culture within each faculty, in a bid to discover opportunities for improvement and development.

T4L is a sophisticated training programme devised by Italian and international experts.

As it is based on analysis of its participants' teaching/learning perspectives, Active Learning theory and student-centred teaching, T4L combines teaching methods and approaches with critical reflection as part of a virtuous circle of strategies, until instructors are ready to walk into a classroom and try out what they have learned.

It all began in early 2016 when a group of instructors from the Department of Industrial Engineering (DII) decided that they wanted to improve how they taught their modules and to open up their classrooms to feedback from the academic community. They were also driven by a desire to explore didactics, rethink their teaching and learning processes, and implement their findings in the classroom. A first residential course was attended by thirty instructors and run by four trainers: three from

the United States and one from Italy. Around thirty-five contact hours were held over three days. A four-hour introductory seminar was held several days before the course started and an experience-sharing meeting six months later. This course marked the beginnings of our Teaching4Learning@Unipd programme.

T4L was inspired by international literature and comparisons between models devised mainly in the US and Canada. It also looked towards more practical experiments conducted to enhance instructor digital competences and to devise related institutional strategies that introduced teaching technologies and e-learning as core features of university classrooms (Federighi et al., 2019; Ghislandi, 2005; Ghislandi & Raffaghelli, 2013, 2014; Ranieri et al., 2018a, 2018b, 2019).

The programme also delved into the experiences of Centres for Teaching and Learning at major US and Canadian universities that had designed information and training courses for instructors, offering them the support of instructional designers to devise and plan new courses and to overhaul current ones.

By the 2000s, Boston University had already opened a centre with about twenty-five instructional designers. For the last 20 years, Harvard has conversed with and observed its instructors individually in micro-teaching sessions, recording lectures and discussing aspects of teaching and communication with each one.

The University of British Columbia, Vancouver, has two centres for teaching and learning: one for its Faculty of Medicine and a university-wide one. In 1962, the University of Michigan founded its Center for Research on Learning and Teaching (CRLT), the first of its kind

in the US. Today, it has a long and successful tradition in continuous instructor-training and in the organisational development of a model and resources that have been hugely impactful (Fedeli, Serbati, Taylor, 2016).

The US has a longer and more structured tradition in professional development for university teachers than other parts of the world, with its Professional and Organizational Development Network in Higher Education (**www.podnetwork.org**) being a successful example of support and passion for teaching and learning excellence in higher education. POD is a community of higher-education professionals that is devoted to improving teaching and learning by promoting resources, publications, project grants, awards, events and research opportunities. Its core values are based on:

1. fostering theory and practice for professional, educational and organisational development;
2. supporting educational-development networks at local, regional, national and international levels;
3. strengthening collaboration between different perspectives and settings;
4. promoting programmes for instructors, administrators and graduates;
5. identifying and collecting strong, accessible research;
6. monitoring and evaluating successes in its field.

POD, alongside other international networks, is a major resource for Italian universities, which today are introducing a host of local instructor-training and organisational-development projects.

In 2018, the University of Padova joined the

European University Association (EUA) and began showcasing its Teaching4Learning model at international level. The EUA, which is one of the world's largest developers of innovative teaching practices and systems, has always shown great interest in T4L, with it winning praise both for its training activities and its 'change agents', who have inspired many other universities to focus on organisational development, as well as on teaching, learning and the related research.

Our first working group was the Thematic Peer Group on Continuous Development of Teaching Competence, which led to a 2019 report.

This peer group focused on a series of challenges and the ensuing recommendations, the result of almost two years of talks that revolved around issues such as:

1. rewards and recognition for the professional development of academic staff;
2. the need to make the impact of their professional development part of quality-assurance processes, linking professional development to improvement in teaching quality;
3. the need for cross-subject development of teaching approaches.

The ensuing recommendations, based on a wide range of pan-European experiences, clearly indicated how these challenges can be tackled at institutional, local, national and European levels. With this in mind, T4L has been presented at institutional tables, with its findings always receiving great interest. An additional opportunity for debate arose at an EUA round table on educational leadership and the role of instructors in higher education. A discussion about the role of change agents stimulated numerous European and

international universities to reflect upon the transformative role these agents can play in scaffolding change within large institutions, such as the University of Padova. Interest in their role peaked with the work of the Thematic Peer Group on Leadership and Organisation for Teaching at European Universities, in which Padova took part.

The University of Padova currently has numerous such agents, and the EUA continues to support our decisions with discussion and debate on the core aspects of education transformation.

The facts and figures behind this report are a source of surprise, pleasure and satisfaction. However, our hearts and minds recall the excitement and stimulating discussions, as well as the less enjoyable, more profound and critical ones, some bordering on the superficial. We also recall how we negotiated and explored ideas, and the enormous amount of research we conducted. Each time we do so, we become increasingly convinced that we are reaping the benefits of our work and heading in the right direction. The path we are treading is the 'Italian way', the one that our University was ready to tread. More than 1,000 colleagues and administrative staff have accompanied us on this journey, along with the University's Digital Learning team, governing body, and change agents. Without their commitment, we would never have achieved such outstanding results.

In conclusion, T4L has snowballed. Although change has been incremental, its roots are solid. They will develop, strengthen and grow, nurtured by the expertise and passion of people who love their profession and believe that teaching is the best job in the world.

Developing quality in teaching

Putting T4L into context

Marina De Rossi
Delegate for Teacher Training and Innovative Teaching

The main priority for any university is to foster teaching quality in a bid to improve learning outcomes and prepare students for the challenges of society and employment (ANVUR, 2018; Gaebel & Zhan, 2018).

In light of this, we should look at three complex inter-connected issues related to teaching and the role of teaching itself: quality of planning, methodology and evaluation; use of digital technologies; and the devising of learning outcomes for the simultaneous development of hard and soft skills, which are among the key competences for lifelong learning in the 21st century (EU Recommendation, 2006).

Implementing quality in teaching requires structural and support action, which must be combined with suitably professional teaching staff. Instructors should thus be trained, with training being understood as a continuous and systemic process (Fedeli, Mapelli, Mariconda, 2021; De Rossi, Fedeli, 2022), and given the wherewithal to make tangible change to their teaching performance. As early as 2005, the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) had identified "teaching staff" as a key area of interest for investment in a transformative process.

Indeed, innovation in teaching practices is believed to be a key factor for improving teaching quality, with its translation into

effective learning outcomes gauging its true value (OECD 2012). Therefore, innovation needs to be supported at institutional level and grounded in a scientific reading of processes to tackle learning issues and new challenges (EUA, 2021).

If innovation is to be effective, then the initial context needs to be thoroughly assessed, delivery continuously monitored, and outcomes evaluated. Furthermore, proposals need to be verified both for educational validity and sustainability in technical and managerial terms.

It is becoming increasingly common for universities to generate teaching data, analyse and use them for various purposes, and then share them to improve teaching/learning processes and practices, as well as to foster institutional literacy.

Increased digitisation is well-known to support university teaching development processes, from management systems to assessment, and has spotlighted a serious need to build suitable ways of collecting, analysing and interpreting data, as well as mainstreaming these ideas within the academic community to build a culture of teaching quality (Wasson, Hansen, & Netteland, 2016).

Data literacy within universities could be used to reflect upon individual classroom teaching practices, with data being considered both as educational content and as a support to methodological approaches that foster student learning (Raffaghelli et al., 2021).

Moreover, data literacy could shift from these initial ideas towards helping to devise complex and strategic institutional plans whereby data are used for the organisational development of teaching as part of Faculty Development (Tsai & Gasevic, 2017).

In light of this, the University of Padova established the T4L Monitoring Group in 2021, as part of the work carried out by its Delegate for Innovative Teaching, in order to investigate the change processes stemming from the Faculty Development project "Teaching4Learning@Unipd", which was launched in 2016 on the initiative of the then Vice-Rector for Teaching Professor Daniela Mapelli and her advisors Professor Monica Fedeli and Professor Carlo Mariconda.

Teaching4Learning (T4L) was designed to support and disseminate the professional development of University instructors, with a focus on student-centred teaching. It involved applying successful international teaching experiences to Italian universities, Padova in particular, as its vast assortment of courses creates a highly complex situation. The beginnings of the project, which is still the cornerstone of the University's Faculty Development plans, saw Padova offer large-scale teacher training with two levels of residential and blended-learning courses: a basic one for new staff and an advanced one for experienced teachers (De Marchi, 2022).

The hallmark of this approach was that the courses were designed both as part of a continuous-learning process, rather than being one-off experiences, and as a means to build communities of practice (CoP), rather than to train individual teachers.

With the arrival of a new governing body at the University, this hallmark has led us to explore the spillover effect of training into teaching processes and whether further investigation is needed into how to read and interpret data stemming from analysis of the relationship between teaching and training.

The T4L Monitoring Group is multi-sectoral

and supported by a host of competences from a range of backgrounds: delegates and advisors, instructors and researchers, innovative-teaching experts, also known as 'change agents', and staff at the University's Accreditation and Teaching Quality Service.

The University's first report (2016–2021) offered a quantitative reading of transformative results deriving from classroom action by course participants and marks the initial phase of a long-term project, with future plans being to provide qualitative analysis on the methodological and technological innovation introduced by instructors and students.

Introducing T4L

Valentina De Marchi
Project advisor on
Teaching4Learning@Unipd®

Teaching4Learning@Unipd® (T4L) is designed to foster and disseminate the professional development of teaching staff in a student-centred environment. It is based upon successful international experiences that have been tailored to the specific requirements of Italian universities, and the University of Padova in particular. The basis and cornerstone of the project, which was launched in 2016, was the development of instructor-training pathways and the creation of a community of practice (CoP) that would kick-start a culture of continuous development, in a bid to improve the quality of the University's teaching.

The first training pathway was launched as pilot project in 2016 at the University's School of Engineering. The school would go on to become a pillar of T4L, offering five courses per year. T4L's key features are its focus on the creation of CoPs by fostering an environment based upon informal peer-interaction; cross-sectoral cooperation involving colleagues from a diverse range of degree courses; and a hands-on approach, which allowed instructors to give and receive feedback on their teaching practices and strategies.

This report illustrates how T4L has evolved since its 2016 pilot to become a permanent feature of the University's teaching panorama by 2021.

It has proven itself both resilient and versatile, as over these five years it has morphed to cater both for the changing needs of University teaching staff, with an Advanced course now complementing its Basic course, and for the University's own specific environment, with its form and content adapting to the emergency

teaching measures required during COVID.

Its training courses are the backbone of a continuous-education project that has branched out in multiple directions to encompass, for instance, workshops on specific teaching methodologies and technologies. Instructors have also had the opportunity to share their experiences during peer-observation sessions and best-practice exchange meetings; educational resources, including MOOCs, videos and podcasts, have been created to consolidate and share experiences across sectors and beyond University boundaries; and projects on teaching-improvement practices have been funded.

Much progress has been made since T4L's humble beginnings. This report takes stock of our achievements thus far, assesses the impact of the major investments made, and gives new impetus to future developments.

1. What T4L offers

T4L is a multi-level training course, with each one tailored to meet bespoke needs. Although the University originally offered a single introductory course, today it offers three: Basic, New Faculty, and Basic-New Faculty. T4L Basic, a 2016 pilot course, is now its most popular offering. It enables instructors to reflect upon their teaching perspectives, explore the features and benefits of student-centred teaching, and design modules at macro (syllabus) and micro (lesson) levels, imparting participatory methods and teaching strategies that place students at the heart of the learning process.

Table 1 shows that the number of courses surged between 2016 and 2018, when they were mainly department-based. In subsequent years, numbers stabilised after courses were offered at University level to instructors from different departments in 2017. Between then and 2019, residential Basic courses were run for the departments of Mathematics, General Psychology, and Pharmaceutical Sciences (2017); Biology, Medicine, Chemical Sciences, Biomedical Sciences, and Economics and Business (2018); and Medicine, Cardio-Thoracic-Vascular Sciences, and Public Health, plus Physics and Astronomy (2019). Two school-level courses were also held at the University's School of Engineering (2016 & 2019) and its School of Agriculture and Veterinary Medicine (2018).

6
Years since the first T4L course started

20
Average number of hours a course lasted

TABLE 1 COURSES HELD		2016	2017	2018	2019	2020	2021	2022	TOT
BASIC LEVEL	T4L Basic	1	4	6	7	-	1	-	19
	T4L Basic-New Faculty	-	-	-	-	3	-	4	7
	T4L New Faculty	-	-	2	2	-	3	-	7
ADVANCED LEVEL	T4L 2.0	-	-	1	-	2	3	1	7
SPECIALISATION LEVEL	T4L Teaching Online	-	-	-	-	1	-	-	1
	T4L Change Agents	-	-	1	-	-	1	-	2
TOTAL NO. COURSES		1	4	10	9	6	8	5	43

In 2018, the need arose to set up a bespoke course for temporary Type A and Type B Researchers. The result was T4L New Faculty. Its twin aims were to train people with no prior teaching experience and to strengthen the community spirit of the courses. The Basic and T4L New Faculty courses were merged in 2022 after a pilot run in 2020, creating the T4L Basic-New Faculty.

An Advanced course (T4L 2.0) was introduced to provide more indepth training for instructors who had taken the Basic courses, with it focusing on instructor-student relations, syllabus building, and how to design and manage feedback and evaluation processes.

The top-tier Specialisation courses (T4L Teaching Online and T4L Change Agents) were devised to complement the others. T4L Teaching Online taught participants how to cope with the pandemic-induced changes to teaching methods, and T4L Change Agents showcased activities to improve learning and teaching within individual departments.

As an addition to these permanent courses, one-off workshops were introduced so that instructors could explore more bespoke topics, including teaching strategies and how to micro-design feedback and evaluation.

43
T4L courses held so far

Furthermore, ***T4L Together*** meetings were organised in 2020 to provide instructors with the chance to compare the effectiveness of their online teaching strategies as the pandemic bit harder. The aim was to establish CoPs that would rapidly disseminate viable online-teaching strategies. The last of the T4L offerings was a meeting devoted to Change Agents.

58
Complementary events held so far

TABLE 2 COMPLEMENTARY EVENTS	2019	2020	2021	2022	TOT
T4L Workshops	4	10	18	6	38
T4L Together	-	23	-	-	23
T4L Change Agents meetings	2	3	-	-	5
TOTAL	6	36	18	6	66

2. T4L course participants

After the first pilot year, the annual number of T4L participants boomed, peaking at just over 180 in 2018, with numbers levelling out at over 100 in subsequent years. The initial boom was due to participants taking the Basic courses. In recent years, however, more instructors have decided to take an Advanced or Specialisation course, once a sizeable percentage had completed a Basic course.

109
Instructors who have attended a course in the last year

640
Number of T4L course participants in the 6 years since courses began

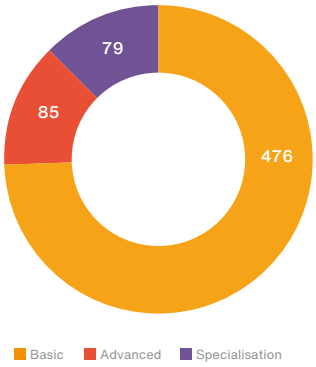


TABLE 3
Annual number* of T4L course participants

		2016	2017	2018	2019	2020	2021	2022
BASIC LEVEL	T4L Basic	26	60	115	103	-	21	-
	T4L Basic-New Faculty	-	-	-	-	52	-	58
	T4L New Faculty	-	-	27	33	-	39	-
ADVANCED LEVEL	T4L 2.0	-	-	13	-	39	33	10
SPECIALISATION LEVEL	T4L Teaching Online	-	-	-	-	37	-	-
	T4L Change Agents	-	-	26	-	-	16	-
ANNUAL TOTAL		26	60	181	136	128	109	68

* Some courses were attended by non-University of Padova staff, or by University of Padova staff who were not Type A/B Researchers (RTA/RTB), University Researchers (UR), Associate Professors (PA) or Full Professors (PO). These participants were not included.

TABLE 4
Cumulative percentages of participants* in T4L courses out of total teaching staff**

		2016	2017	2018	2019	2020	2021	2022
BASIC LEVEL	T4L Basic	1.26	4.12	9.47	13.41	12.89	13.32	12.60
	T4L Basic-New Faculty	-	-	-	-	2.29	2.38	4.53
	T4L New Faculty	-	-	1.27	3	3.44	4.93	5.35
ADVANCED LEVEL	T4L 2.0	-	-	0.61	0.64	2.38	3.72	3.87
SPECIALISATION LEVEL	T4L Teaching Online	-	-	-	-	1.63	1.56	1.48
	T4L Change Agents	-	-	1.22	1.18	1.06	1.73	1.65

* Some courses were attended by non-University of Padova staff, or by University of Padova staff who were not Type A/B Researchers (RTA/RTB), University Researchers (UR), Associate Professors (PA) or Full Professors (PO). These participants were not included.

** Calculations based on University of Padova teaching staff (RTA, RTB, RU, PA, PO) on 1 January each year.

T4L complementary events also saw a surge in participant numbers. In only four years, 542 instructors took part in the workshops and, once teaching had gone online in 2020, 355 instructors shared their experiences in the ***T4L Together*** meetings.

14.5
Average number of participants for each of the 30 workshops

TABLE 5 Annual number of participants in T4L complementary events

	2019	2020	2021	2022	TOT
Workshop	86	160	188	108	542
T4L Together	-	355	-	-	355
T4L Change Agents meetings	11	20	-	-	31
Annual total	97	535	188	108	928

* Some courses were attended by non-University of Padova staff, or by University of Padova staff who were not Type A/B Researchers (RTA/RTB), University Researchers (UR), Associate Professors (PA) or Full Professors (PO). These participants were not included.

TABLE 6 Cumulative percentage of participants* in at least one complementary event out of total teaching staff (annual percentage)

	2019	2020	2021	2022
Workshop	3.91	9.66	14.14	15.65
T4L Together	-	15.67	15.14	13.92
T4L Change Agents meetings	0.5	0.93	0.95	0.86

* Some courses were attended by non-University of Padova staff, or by University of Padova staff who were not Type A/B Researchers (RTA/RTB), University Researchers (UR), Associate Professors (PA) or Full Professors (PO). These participants were not included.

3. T4L pathways

This section looks at the three T4L pathways.

The first-tier, or Basic pathway, was undertaken by instructors who limited their T4L experience to the Basic course.

The second, or Focused pathway, saw instructors take the Basic course plus at least another two T4L complementary events (see Table 6). Finally, the Intensive pathway involved participation in both the Basic and Advanced courses.

In 2022

32,3%

of instructors attending one T4L pathway took Focused or Intensive

Basic Course	+	No more than one complementary event	=	Basic pathway
Basic Course	+	Two or more complementary events	=	Focused pathway
Basic Course	+	Advance course	=	Intensive pathway

By the end of 2022

538

instructors had taken a T4L pathway

88

instructors had taken a Focused pathway

86

instructors had taken an Intensive pathway

Annual numbers

The number of T4L participants each year reveals that a significant proportion decided to continue their training beyond the Basic pathway. Out of all T4L participants, i.e. anyone who had completed at least one Basic course, 10 went on to complete the Intensive pathway in 2022, i.e. they also completed an Advanced course, and 15 completed the Focused pathway, i.e. they also attended at least two workshops. Some 52 additional instructors also took a Basic course. [6]

TABLE 7 Annual number of participants* in T4L pathways

	2016	2017	2018	2019	2020	2021	2022
Basic pathway	26	58	129	120	39	45	52
Focused pathway	-	-	-	33	30	19	15
Intensive pathway	-	-	8	-	39	31	10

* Some courses were attended by non-University of Padova staff, or by University of Padova staff who were not Type A/B Researchers (RTA/RTB), University Researchers (UR), Associate Professors (PA) or Full Professors (PO). These participants were not included.

6 Figures should be read annually: instructors completing a Basic course in 2019 and an Advanced one in 2020 are recorded as completing the Basic pathway in 2019 and the Intensive pathway from 2020.

Cumulative percentages

After T4L had been up and running for three years—one pilot year at the School of Engineering and another two open to all University instructors—10.6% of the University's teaching staff had completed a Basic course. Between 2019–2021, this percentage continued to grow steadily, despite the pandemic, with one in five teaching staff becoming involved.

Out of this 20.3%, 31.9% (6.49% of all teaching staff) continued their training with an Intensive or Focused pathway, while the remainder attended a Basic pathway only. The cumulative percentages continued to increase in 2022, with 15% of all teaching staff completing the Basic pathway.

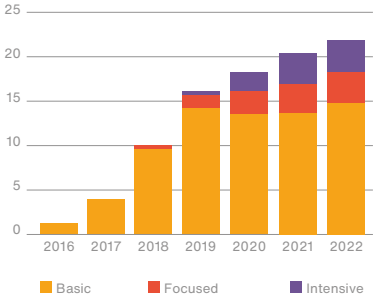


Figure 1 Percentage of instructors who completed a T4L pathway in that year or in past years out of total teaching staff (annual percentage)

Workshop participation

Figure 2 shows the number of instructors who attended between one and five or more workshops divided by pathway. It shows that anyone not taking a T4L pathway by 2022 attended a low number of events. In contrast, instructors who completed a Focused or Intensive pathway attended numerous workshops, underscoring that there was a group of T4L enthusiasts interested in continuing their training.

Note that the data should be read annually, i.e. instructors completing a Basic course in 2019 and an Advanced one in 2020 are recorded as completing the Basic pathway in 2019 and the Intensive pathway from 2020.

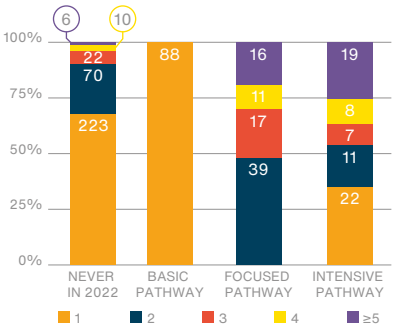


Figure 2 Number of workshops attended between 2019 and 2021 by pathway completed at the end of 2021

Analysis by academic rank

This section provides more thorough analysis on T4L course participants in terms of their academic rank. Table 8 shows that until 2020 Associate Professors (PA) accounted for more than 30% of participants. In recent years, temporary Type A and B Researchers (RTDA/RTDB) made up more than 50% of participants after T4L was opened up to them, and especially once bespoke courses had been devised. The proportion of PAs is particularly high in the Focused and Intensive pathways, with researchers representing the majority of Basic pathway participants.

KEY

PO	Full Professor
PA	Associate Professor
RTDA	Type A fixed-term Researcher
RTDB	Type A fixed-term Researcher
RU	University Researcher
T4L	Teaching4Learning

TABLE 8 T4L participants by academic rank (percentage by year)

PATHWAY PARTICIPANTS	2016	2017	2018	2019	2020	2021	2022
PO	11.5	13.8	12.2	8.2	9.6	5	5.3
PA	53.8	34.5	36.6	39.3	46.2	21.7	7.0
RTDA	-	13.8	9.2	21.3	15.4	31.7	61.4
RTDB	7.7	10.3	22.9	18	17.3	33.3	24.6
RU	26.9	27.6	19.1	13.1	11.5	8.3	1.8

	BASIC PATHWAY							FOCUSED PATHWAY				INTENSIVE PATHWAY				
YEAR	2016	2017	2018	2019	2020	2021	2022	2019	2020	2021	2022	2018	2019	2020	2021	2022
PO	11.5	13.8	12.4	8.3	10.3	2.2	5.8	11.8	13.3	15.8	13.3	-	-	10.3	3.2	10
PA	53.8	34.5	36.4	39.2	41	11.1	7.7	39	53.3	63.2	26.7	25	-	43.6	58.1	50
RTDA	-	13.8	9.3	21.7	15.4	37.8	65.4	14.4	-	5.3	13.3	37.5	-	17.9	9.7	20
RTDB	7.7	10.3	23.3	17.5	20.5	42.2	19.2	20.4	10	10.5	40	12.5	-	10.3	16.1	20
RU	26.9	27.6	18.6	13.3	12.8	6.7	1.9	14.4	23.3	5.3	6.7	25	-	17.9	12.9	-

≤ 10%	10% > 20%	20% > 30%	30% > 40%	40% > 50%	≥50%

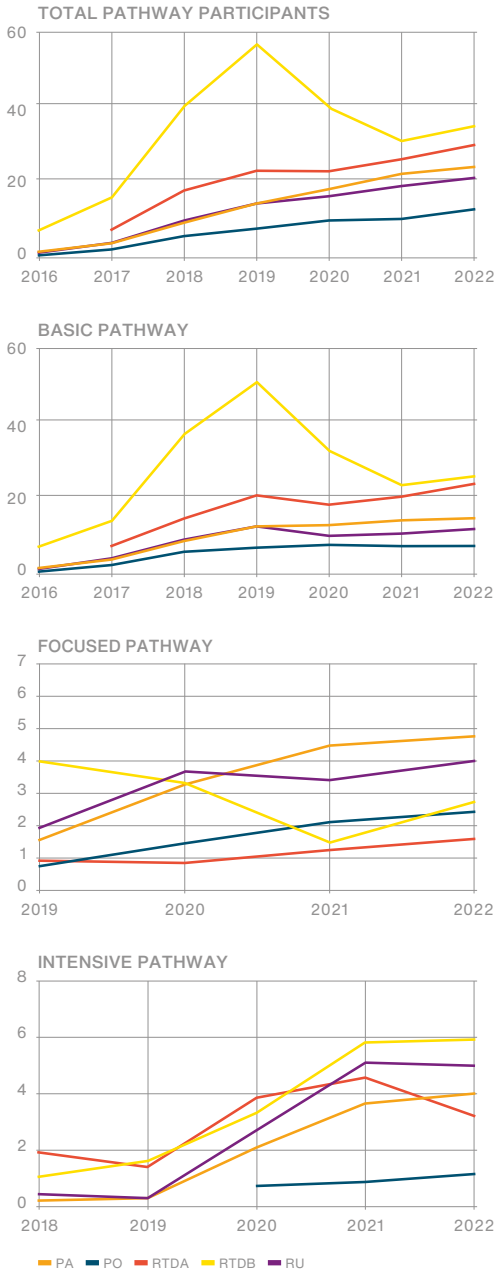


Figure 3 Percentage of instructors participating in at least one T4L pathway in that year or in past years by academic rank (year-by-year percentage)

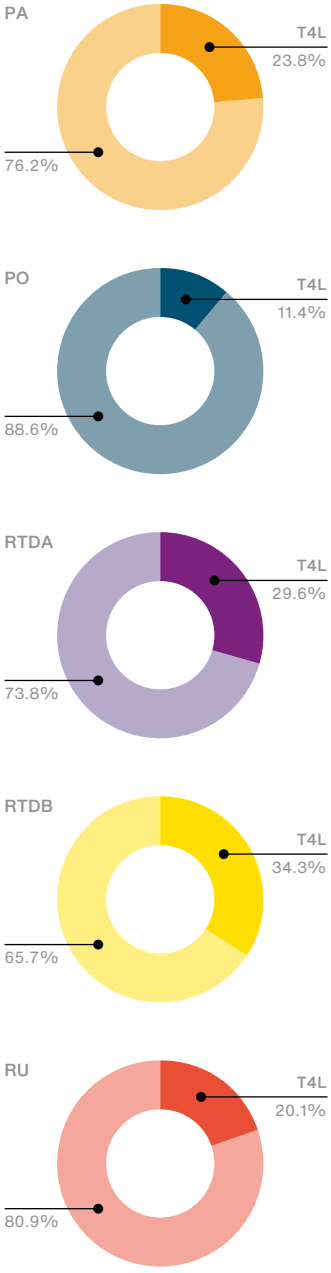


Figure 4 Percentage of T4L pathway participants reached in 2022

National university subject area

Our findings are clearly differentiated when we look at the percentages of eligible participants by national university subject area, with Science Technology Engineering and Mathematics (STEM), Agricultural and Veterinary Sciences, and Economics and Statistics boasting the highest proportions. Indeed, more than 30% of the instructors teaching in some subject areas in a given year had attended at least one T4L course.

TABLE 9 Percentage of instructors who attended at least one T4L pathway in that year or in past years by national university subject area (year-by-year percentage)

YEAR	2016	2017	2018	2019	2020	2021	2022
Civil Engineering and Architecture	6.2	6.2	9.1	8.7	9.6	13.5	15.4
Industrial and Information Engineering	5.7	6.0	7.6	15.4	17.3	20.4	25.5
Agricultural and Veterinary Science	-	3.1	14.2	20.8	24.5	28.6	30.7
Biology	-	1.2	23.2	23.9	29.4	30.6	33
Chemical Sciences	-	7.7	21	25.8	29.5	31.3	34.4
Ancient World, Philology, Literature, History of Art	-	1.6	4.5	6.6	8.7	12.3	13.2
Earth Sciences	-	3.8	8.9	8.8	15.5	19.6	19.7
Economics and Statistical Sciences	-	1.7	13.4	26.8	28.3	28.7	29
Physics	3.6	5	7.7	19.9	19	21.9	23.3
Law	-	0.8	2.4	4.7	7.1	9.2	10.7
Mathematics and Computer Science	4.2	20.9	21.9	23.3	25.8	24.6	24.2
Medicine	-	1.4	6.6	15.2	15.6	17	18.4
Political and Social Science	-	3.6	5.3	5.5	7.1	9.2	17.6
History, Philosophy, Pedagogy and Psychology	-	3	5.7	9.8	10.8	12.7	12.8

≤ 5%	5% > 10%	10% > 15%	15% > 20%	20% > 25%	≥25%

TABLE 10.1 Percentage of instructors who attended the **Basic pathway** in that year or in past years by national university subject area (year-by-year percentage)

	BASIC PATHWAY						
YEAR	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Civil Engineering and Architecture	6.2	6.2	9.1	8.7	8.2	9.5	9
Industrial and Information Engineering	5.7	6	7.1	12.6	13.8	14.6	19.5
Agricultural and Veterinary Science	-	3.1	11.2	15.7	9.6	11.7	13.8
Biology	-	1.2	23.2	22.8	25	22.5	23.6
Chemical Sciences	-	7.7	20.2	25	24	23.4	25
Ancient World, Philology, Literature, History of Art	-	1.6	3.8	5.9	6.5	8.9	9.2
Earth Sciences	-	3.8	8.9	8.8	10.3	10.7	11.5
Economics and Statistical Sciences	-	1.7	10.9	23.6	22.8	20.2	21.7
Physics	3.6	5	7.7	16.9	16.1	16.8	17.8
Law	-	0.8	2.4	4.7	5.5	6.2	7.1
Mathematics and Computer Science	4.2	19.1	18.8	17.8	17.2	16.4	14.4
Medicine	-	1.4	6	14.1	12	11.9	12.5
Political and Social Science	-	3.6	3.5	3.6	5.4	6.2	14.7
History, Philosophy, Pedagogy and Psychology	-	3	5.3	9.4	8.2	9.3	8.9

≤ 5%	5% > 10%	10% > 15%	15% > 20%	20% > 25%	≥25%

TABLE 10.2 Percentage of instructors who attended the **Focused pathway** in that year or in past years by national university subject area (year-by-year percentage)

	FOCUSED PATHWAY			
YEAR	**2019**	**2020**	**2021**	**2022**
Civil Engineering and Architecture	-	1.4	2.7	2.6
Industrial and Information Engineering	2.4	2.4	2.7	3.2
Agricultural and Veterinary Science	4.6	8.7	9.7	9.6
Biology	1.0	2.5	4.3	5.7
Chemical Sciences	0.8	2.3	3.1	3.9
Ancient World, Philology, Literature, History of Art	-	1.4	2.1	2.6
Earth Sciences	-	1.7	3.6	3.3
Economics and Statistical Sciences	0.8	1.6	2.3	2.2
Physics	2.9	2.9	2.9	3.4
Law	-	0.8	1.5	1.4
Mathematics and Computer Science	5.4	7	5.2	6.1
Medicine	0.9	1.1	1.9	2.3
Political and Social Science	-	-	-	-
History, Philosophy, Pedagogy and Psychology	-	1.5	1.5	2.1

≤ 5%	5% > 10%	10% > 15%	15% > 20%	20% > 25%	≥25%

TABLE 10.3 Percentage of instructors who attended the Intensive pathway in that year or in past years by national university subject area (year-by-year percentage)

	INTENSIVE PATHWAY				
YEAR	**2018**	**2019**	**2020**	**2021**	**2022**
Civil Engineering and Architecture	-	-	-	1.4	3.8
Industrial and Information Engineering	0.4	0.4	1.2	3.1	2.8
Agricultural and Veterinary Science	0.5	0.5	6.3	7.3	7.3
Biology	-	-	2	3.8	3.8
Chemical Sciences	-	-	3.1	4.7	5.5
Ancient World, Philology, Literature, History of Art	0.8	0.7	0.7	1.4	1.3
Earth Sciences	-	-	3.4	5.4	4.9
Economics and Statistical Sciences	1.7	2.4	3.9	6.2	5.1
Physics	-		-	2.2	2.1
Law	-	-	0.8	1.5	2.1
Mathematics and Computer Science	-	-	1.6	3	3.8
Medicine	0.3	0.3	2.5	3.2	3.6
Political and Social Science	1.8	1.8	1.8	3.1	2.9
History, Philosophy, Pedagogy and Psychology	0.4	0.4	1.1	1.9	1.8

≤ 5%	5% > 10%	10% > 15%	15% > 20%	20% > 25%	≥25%

4. Evaluating the effectiveness of the T4L Basic course

Further analysis was conducted to discover how effective instructor participation in T4L pathways had been. We used satisfaction questionnaires to ask students their opinion on teaching effectiveness and measured how soon they were passing their examinations after lessons had finished, i.e. which session. Both measures are recommended by literature as indices for the success of training.

The ambitious aim to conduct evaluation analysis on the impact of our learner-centred approaches was made possible by consulting related national and international literature and by massive cross-referencing of existing databases. It was one of the first attempts in Italy and Europe to do so and has paved the way for subsequent studies. Its findings are inspirational, as they both evaluate the effectiveness of the T4L project and encourage educational institutions, as well as the entire academic community, to tread similar paths.

Below we briefly review the dataset and methodology of our analysis, its initial findings, and future lines of development for analysing the impact of innovative teaching on students.

4.1 Building a dataset

A single dataset was built for this section's analysis. It comprised:

- anonymous data for 168,859 students at the University of Padova from academic years 2014–15 to 2021–22, in particular on their undergraduate careers and opinions on teaching garnered with end-of-course satisfaction questionnaires;
- data on 3,278 instructors and 20,036 modules,[6] including personal details and T4L attendance.

Please see the Appendix for a more precise definition of the analysis sample.

The end dataset included information on 150,764 students, 7,995 modules and 2,575 instructors. These figures equate to 10,832 course-instructor combinations and a staggering 1,750,219 student-module observations. Note that each course-instructor may have multiple modules and be attended by one or more students.

Table 11 details these numbers by academic year.

TABLE 11 Number of observations in the end dataset by academic year

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Students	30,587	36,086	37,317	38,715	38,894	40,113	43,033	39,491
Instructors	1,586	1,889	1,940	1,973	2,000	2,009	2,046	1,824
Courses	2,865	3,818	3,949	3,895	3,897	3,930	4,083	3,211

NB: Some students in academic year 2014–15 may also have attended subsequent years and are thus recorded in more than one column.

6 A total of 34,871 module-instructor observations.

Out of the 2,575 instructors in the end dataset, 909 were women and 1,666 were men. There were 729 University Researchers, 168 fixed-term Type B Researchers and 362 Type A, as well as 501 Associate Professors and 815 Full Professors.

Table 12 shows the number of instructors 'treated', i.e. those who attended a T4L Basic pathway, and the total number of teaching staff by year:

TABLE 12 Distribution of treated and untreated instructors in the end dataset by academic year

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Treated	80	115	174	235	300	317	305	266
Untreated	1.506	1.774	1.766	1.738	1.700	1.692	1.741	1.558
Total	1.586	1.889	1.940	1.973	2.000	2.009	2.046	1.824

NB: Some instructors included in academic year 2014-15 may also have been included in subsequent years and are thus recorded in more than one column.

4.2 Measuring impact

Our analysis aimed to assess the implications of T4L training on student learning. We were aware that many factors were impossible to measure, making our impact assessment imperfect. However, inspired by the related literature, four approximate variables of interest were used. The first three were based on student opinions and allowed us to assess subjective impressions of the teaching delivered, as measured by end-of-course satisfaction questionnaires. Our analysis focused mainly on three specific questions:

1. "Overall, how satisfied are you with the course?" (OVERALL)
2. "Did the instructor(s) present the topics clearly?" (CLARITY)
3. "Did the instructor stimulate/motivate interest in the subject?" (STIMULATION)

For each question, students were asked to provide a value on a scale of 1 to 10. For statistical purposes, the scale was standardised with mean 0 and variance 1 (Z-score).

A fourth variable provided a more objective measurement of teaching effectiveness, as it looked at whether the examination was passed in the first available session after the module had ended, or in a subsequent session (TIMELINESS). Table 13 summarises the information for all four variables.

TABLE 13 Distribution of the variables of interest in the end dataset

	OBSERVATIONS INCLUDED	OBSERVATIONS EXCLUDED	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
R-Overall	927.113	823.106	7.75	1.88	1	10
R-Clarity	925.807	824.412	7.83	2.01	1	10
R-Stimulation	926.521	823.698	7.76	2.12	1	10
Timeliness	1.750.219	0	0.51	0.50	0	1

R-OVERALL: "Overall, how satisfied are you with the course?"
R-CLARITY: "Did the instructor present the topics clearly?"
R-Stimulation: "Did the instructor stimulate/motivate interest in the subject?

4.3 Analysis methodology and findings

One seemingly intuitive method for estimating the impact of innovative teaching is to observe how the variables of interest changed once an instructor had attended a T4L pathway. This method, however, allowed no control over the impact of simultaneous events, which might have affected outcomes.

Econometric literature has developed various methods to account for these events, the most popular being

Difference-in-Differences (DiD), which aims to remove the impact of simultaneous events from an observed effect.[6]

More recent literature has extended DiD to situations when treatment occurs at different times, [7] as it does in our case.

The next section contains the results for all of the University's schools, except for Medicine and Engineering due to the availability and homogeneity of certain data (see Appendix).

4.4 T4L participation and teaching effectiveness

Figure 4 shows the treatment effect, as estimated with DiD, on each of the four variables of interest in the three years pre-treatment and in the two years post-treatment. As expected, T4L had no impact on the pre-treatment years, which suggests that it does not produce anticipation effects.

In addition to showing the point estimate of the treatment effect (represented by the dots), the figure provides the confidence interval (the segments above and below the dots). The confidence interval enables us to quantify the uncertainty surrounding our estimates with 95% accuracy.

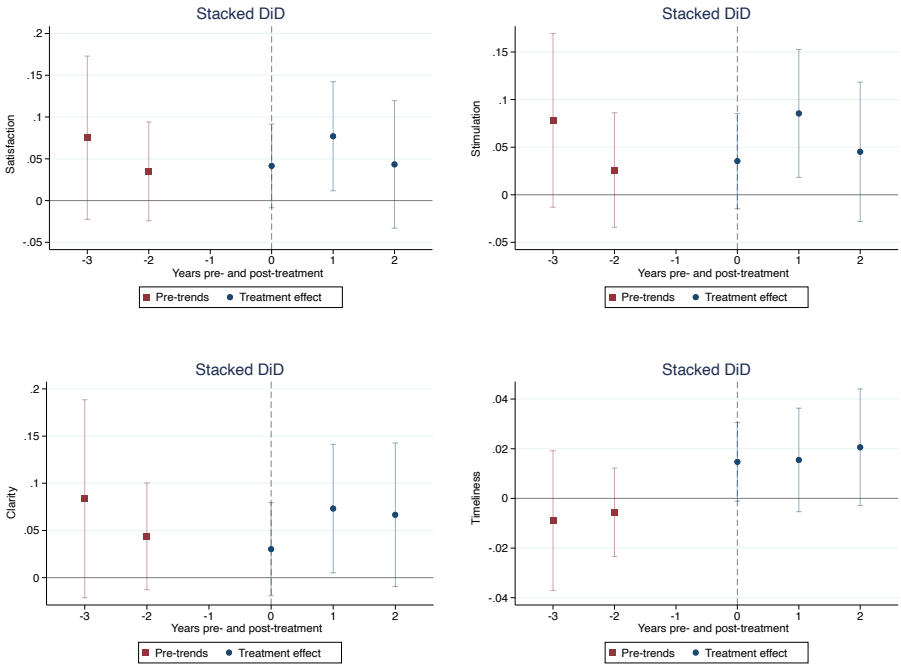
Figure 4 thus shows that a significant positive effect occurred one year after instructors had attended a T4L course.

In other words, instructors who participated in at least one Basic T4L course enjoyed higher course ratings in terms of overall satisfaction, clarity of delivery, and stimulation. This treatment effect can be quantified as 0.075–0.080 points on the Z-score, or 0.15–0.16

6 To achieve this objective, the process requires the effect observed in the untreated (control) cases to be subtracted from the variation over time for the treated cases. It is assumed that the variation observed in the control set of instructors is similar to that in treated instructors if they had not attended

7 Known as "staggered Difference-in-Differences". For a recent review of related literature, see Roth et al. (2022).

Figure 4 Findings for treatment effectiveness, excluding the Schools of Medicine and Engineering



NB: Treated-Untreated difference at various times pre- and post-treatment. 95% confidence interval. Note that the difference observed between the two groups in the year prior to attending a T4L course has been subtracted for technical reasons. Effect at time -1 is therefore 0.

points, a success when these data are measured on a scale of 1 to 10 as it meant that the majority of ratings ranged between 6 and 9.

Our findings suggest that far from worsening teaching performance, attending a T4L course increased average levels of student satisfaction. The effect on the three questionnaire-based variables, however, is temporary, as it vanished two years after treatment.

The effect on "Timeliness" proved to be minor and statistically insignificant.

To investigate our findings further, we explored

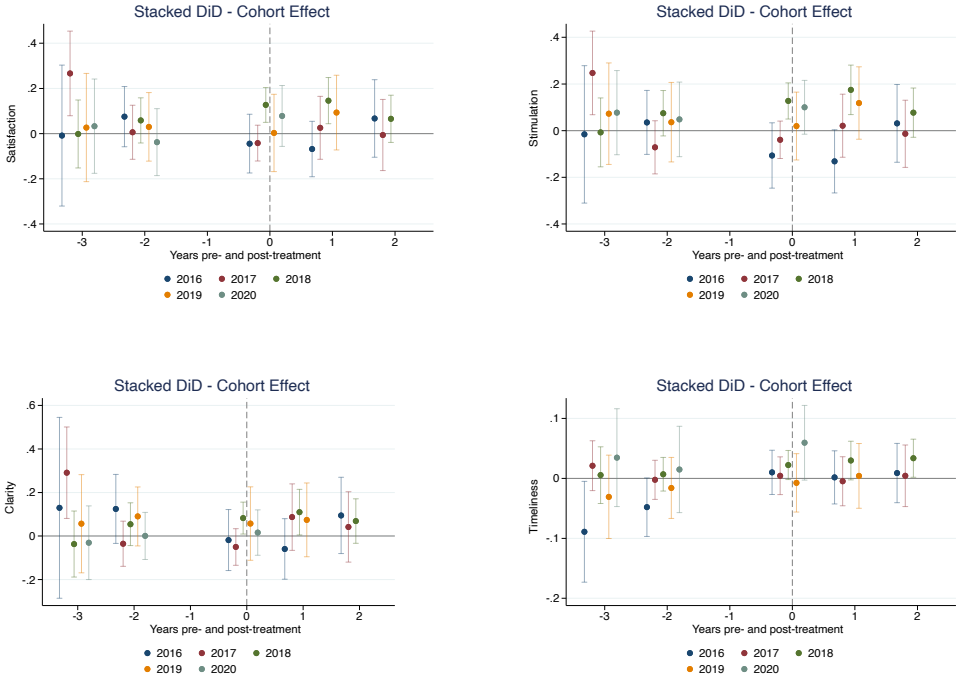
whether this positive impact varied over time. Figure 5 illustrates the effectiveness of T4L by separating the effects according to the year the instructor(s) were treated. Interestingly, the significant effects observed in Figure 4 were mainly due to the effect observed for instructors treated in 2018.

This group saw a rise in student motivation by almost 0.5 on a scale of 1 to 10. One explanation may be that these instructors participated in T4L after any teething issues had been ironed out. They also had the opportunity to try out their newly acquired skills before Covid-19 forced classes online. The pandemic and its consequences may have mitigated the effectiveness of their training, as instructors had fewer possibilities to apply what they had learnt in an online classroom.

One final insight looks at potential differences among the instructors in terms of their academic rank. T4L had a more rapid effect on Associate and Full Professors, i.e. the ranks with more extensive teaching experience. The programme, however, had a slower effect on Researchers, as a substantial impact was observed only two years after they had taken a T4L course. When this distinction among ranks is made, a significant positive effect is observed on the timeliness of students passing their examinations, thus supporting the evidence that T4L courses improve teaching performance, especially among Associate and Full Professors.[8]

8 NB: These courses are compulsory for fixed-term Researchers, but voluntary for Associate and Full Professors. Therefore, these data may also include the factor that the courses are more effective when their participants are motivated to attend.

Figure 5 Findings for treatment effectiveness by treatment year, excluding the Schools of Medicine and Engineering.



NB: Treated-Untreated difference at various times pre- and post-treatment. Results by treatment year. 95% confidence interval. Note that the difference observed between the two groups in the year prior to attending a T4L course has been subtracted for technical reasons. Effect at time -1 is therefore 0.

4.5 Discussion and conclusions

Our initial quantitative analysis was a complex effort to gauge whether and, if so, how the T4L pathways had a positive effect on student-learning, a feat that had never been attempted by the University of Padova, or any other educational establishment. Although we are aware that it in no way captures the full complexity of phenomena such as learning and teaching, we wanted to provide a methodical overview of what attending T4L pathways brought to the classroom. Our aim was

to provide an additional means for scrutinising the first leg of our journey and for enabling us to make future decisions. The fact that we have compiled this report is, in itself, significant added value to the T4L project.

Furthermore, its content is a clear indication that T4L's innovative teaching methods have had a beneficial effect on our student population's satisfaction with their instructors' teaching, a key domain for any university committed to improving the quality of its educational offerings.

Investigation of ambitious projects such as T4L requires a longer timescale than could be covered in this report, as well as a wider variety of indicators that would capture the full extent of the project's scope and reach. This statement is especially true when dealing with the complex world that is the University of Padova, with its vastly diverse range of degree courses, subjects and teaching centres, the scale of which could not be fully covered in our initial analysis.

Far from being the culmination of our work, this report is the first in a series of indepth investigations that will be undertaken by University's Monitoring Group in a bid to comprehend the extent to which instructors have introduced innovative teaching into the classroom and to facilitate its introduction in the years to come.

Some evidence suggests that the impact assessment of T4L is conservative.

Firstly, questions remain as to the true level of satisfaction with teaching, as many students do not respond to the questionnaires, and the ones that do devote little attention to completing them.

Secondly, the ushering-in of online classrooms to cope with the pandemic prevented instructors from fully applying the innovative techniques they had learned, limiting T4L's effectiveness.

Thirdly, and possibly most importantly, the scale on which instructors brought innovative teaching methods into the classroom is unknown. Clearly, should instructors not apply their newly acquired

teaching skills to a classroom setting, T4L will have zero effect.

One case in which it may be particularly difficult to apply innovative teaching strategies and methodologies is when a course comprises multiple modules taught by different instructors. In this case, innovation may be hindered as modules need to be consistent and teaching methods agreed with non-T4L colleagues.

Current data shed no light on these issues, but the Monitoring Group plans to conduct complementary research that should enable it to understand the extent to which innovative teaching has been introduced by instructors and to facilitate its introduction in the years to come. Future reports will attempt to understand the link between teacher and student education.

Appendix – Complementary findings and analysis of the Medicine and Engineering schools

Determining the analysis sample

Our data came from a range of sources and pooling them led to issues that resulted in some loss of observations. Below is an account of how we calculated our analysis sample.

Our sample did not include data on approximately 15% (3,114) of the University's educational offerings because they were laboratories or pass/fail modules, which could not be compared with traditional courses, or because they comprised multiple separate modules (what the University calls 'integrated' courses).

Nor did our sample include modules taught by non-tenured instructors (e.g. teaching assistants and external teaching staff), which accounted for around 15% (2,509) of total modules.

As our research strategy compared teaching performance before and after attendance of T4L courses, our sample excluded modules lasting one academic year [6] and ones that instructors had not taught before attending a T4L course.

Regarding current data on the student population, the satisfaction questionnaire is available to just over 50% of students who enrol for their examinations.[7] Information about when students passed their examinations is missing only in the few cases when

6 Some 9,597 out of 20,734 module-instructor observations.

7 t is only compulsory for students to complete the questionnaire when they take their examination in the session immediately after the course finishes. They are not obliged to complete it if they take the examination in subsequent sessions. Nor do they have to complete it when the instructor enrols them in the examination manually. Students are required to complete one questionnaire only when a course has multiple modules. We excluded 1,068,668 student-module observations out of the 2,231,902 observations remaining after the previous adjustments.

the examination has not yet been passed, or when a student has decided to drop-out. [8]

The sample does not include students who are behind with their examinations, those on mobility schemes (e.g. Erasmus), and other special cases [9] in order to ensure that the dataset was as uniform as possible and to limit estimate errors.

The above data-filtering and cross-referencing led to an additional 9% of observations (1,278 courses) being excluded as their sources were considered to be incongruent.

As filtering affected courses mainly at the Schools of Engineering and Medicine, the sample excluded both.

The two schools were accounted for in a separate analysis, which will be covered briefly in the next section of this Appendix.

Additional analysis

Figure A.1 illustrates the effect that innovative teaching had on two cases: (1) the likelihood that students would choose to take an optional course in the same subject area delivered with innovative teaching; and (2) on the probability that they would write a subject-related dissertation. In both cases, around 45% of observations had to be excluded from the sample, e.g. because the students had not yet graduated, or because they had not yet attended innovative-teaching based modules.

Innovative teaching does not appear to have had any significant effect on either case. Note that the Schools of Medicine and Engineering were excluded from the dataset for both of these cases, as well. In addition, as data for course subject areas were missing, we had to assume that these areas were the same as the instructor's specialised field.

We then investigated the spillover effects that resulted

8 Examination-pass dates missing: 461,369 out of 2,231,902.

9 We excluded 461,161 student-module observations out of the 2,691,219 in the initial student-career file.

from instructors introducing innovative-teaching techniques.

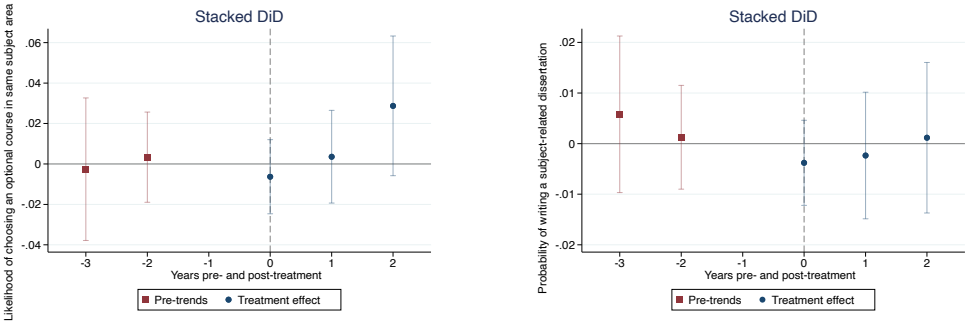
Two definitions were provided for courses considered to have experienced a spillover effect: 1) when the instructor(s) teaching it was non-T4L, but at least one student attending that course in a given year was also attending a course taught by a T4L instructor; and 2) at least 25% of the students attending a non-T4L instructor course were also attending one delivered by a T4L instructor. The logic behind each definition attempted to understand whether students altered the effort they made or their opinion on a course when it was taught by an instructor who delivers innovative teaching. Out of the 10,832 module-instructors in the end dataset, 3,742 were treated as coming under Definition 1, and 2,125 as coming under Definition 2.

In both cases, our findings showed no significant effect on student opinion and only a weak positive effect on the timeliness of passing the examination.

Effects of T4L on the Schools of Medicine and Engineering

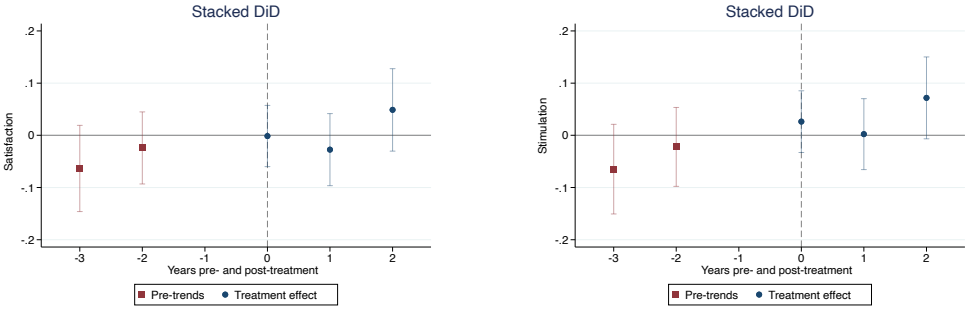
Figure A.2 illustrates that the estimates for the Schools of Medicine and Engineering are small and statistically insignificant. These findings may be down to two reasons: the low number of observations and the high number of 'integrated' and 'channelled' [NdT: ho aggiunto io una nota sul consiglio di Alberto] courses, which are less suited to innovative teaching (see above).

Figure A.1 Findings for treatment effectiveness on complementary outcomes.



NB: The difference between courses affected and unaffected by spillover at various times pre- and post-treatment. 95% confidence interval. Note that the difference observed between the two groups in the two groups in the previous year was subtracted from frequency. Effect at time -1 is therefore 0.

Figure A.2 Findings for treatment effectiveness for the Schools of Medicine and Engineering.



NB: The difference between courses affected and unaffected by spillover at various times pre- and post-treatment. 95% confidence interval. Note that the difference observed between the two groups in the two groups in the previous year was subtracted from frequency. Effect at time -1 is therefore 0.

Supervisors
Marina De Rossi
Valentina De Marchi

Working Group
Marco Bertoni
Ettore Bolisani
Coralba Cappellato
Juliana Elisa Raffaghelli
Valeria Genova
Lorenzo Rocco
Laura Schiavon
Cristina Stocco

Editors
Michele Castegini
Alberto Antonello

Graphic Design and Editing
Ufficio Comunicazione ACOM

teaching4learning@unipd.it
www.unipd.it/teaching4learning

maggio 2023

via VIII febbraio 2 Padova
www.unipd.it

www.unipd.it