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ITS vocational courses in Italy. Evidence from the *Focus on Youth* project

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The present research project was promoted by Assolombarda's Education Systems and Human Capital Unit and was conducted by Gabriele Ballarino and Stefano Cantalini (Dept. of Social and political sciences, University of Milan).
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Introduction

The present research was conducted within the framework of the "Focus on Youth: develop ITS employability" project, promoted by Assolombarda Confindustria Milano, Monza e Brianza, Lodi, with the support of the JPMorgan Chase Foundation. Its objective was to further develop the model of Higher Technical Education (Istruzione Tecnica Superiore), both in Lombardia and at a national level, as a training opportunity able to facilitate the transition of young people towards the labour market.

Higher Technical Institutes (ITS) constitute a tertiary training channel which was launched in 2011 in order to respond to companies' demand for high quality, innovative, skills. ITS are schools that offer highly specialised technological courses, in line with the most advanced European vocational training models, alternating schooling and work. The strong link between the corporate system and ITS training courses ensures high placement rates for the young people who attend them. The employment rate of ITS students a year after graduation is around 80%, but the number of students enrolled in these institutes is still low (more than 11.000 students in the whole of Italy in 2018).

The limited number of students – combined with the limited awareness young people and families have of such programmes – is also due to the limited public resources available for financing them (about 23 million euros from State funds, plus roughly 50 million euro from Regional funds), as opposed to University funding (the figure for 2017 was about 6.6 billion, only including ordinary funding). Aside from intense lobbying efforts on a national scale in favour of increasing funding for this type of training, Assolombarda also deems it necessary to enhance the operational and financial capacity of ITS by encouraging greater corporate involvement and a more structured partnership with companies, including higher apprenticeships. Consequently, the "Focus on Youth: develop ITS employability" project provides for three experimental courses. Its aim is to adequately promote the use of apprenticeships in vocational courses, in order to create a model to be applied at a larger, national, scale.

In this context, this report has three aims. First, it gives a general overview of ITS in Italy. Such an overview places them in the general context of vocational training in Italy, which will be presented in comparative perspective (chapter 1) and provides up-to-date evidence analysing the national micro-data on ITS collected by INDIRE, National Institute for Documentation, Research and Innovation in teaching (chapter 2). Second, we study in depth the three ITS courses designed in the frame of the Project 'Focus on Youth', namely: Mechatronics *(ITS Sistemi meccatronici autoferrotranviari);* Chemistry (*ITS Applicazioni industriali della gomma e del PTFE*) and Tourism (*ITS Food and beverage management*). Third, we discuss our findings and outline the conditions of replicability and portability of the ITS model developed by the Project FoY.

Part 1. The Scenario

1. The Italian VET in comparative perspective

Since the 80s, attention to vocational training and education (VET) has substantially arisen among both policymakers and scholars. Two were the main reasons behind this interest. First, investing in VET appeared to be a possible remedy against unemployment: indeed, such an investment would increase the offer of skills, thereby enabling firms to shift their competitive strategy towards the *high road* which links high workforce skills, systematic application of technology to production, relatively high wages and a product strategy oriented towards competition on quality instead of on price (Soskice 1999), according to what has been termed a *supply side Keynesism* perspective (Streeck 1992). Second, in the 80s and 90s the manufacturing success of Germany and Japan, together with the difficulties of UK and US manufacturing firms, stimulated interest in the production of skills, both technical and social, as a means to boost economic performance, in a context of increasing global competition (Dore 1987; Soskice 1994).

More recently, another scholarly approach to VET systems has emerged, one that looks not only at the impact of skill provision on employment and economic development, but also at its relation with inequality and social stratification patterns as well as to social policies. Such an interest was also a part of the early studies: for instance, Maurice, Sellier and Silvestre's (1986) pioneering in-depth comparative study of a small set of German and French manufacturing plants gave less emphasis to the technical skills learned by the German workers in the dual apprenticeship system than to the latter's beneficial social effects, for instance concerning the self-perception of workers, their relations to the line management and their propensity to industrial conflict. In the more recent literature, this interest has extended to social stratification: a strong VET is seen as a way to guarantee access to good jobs and to the related social welfare benefits for those young people, mostly with a working-class family background, who are not fit for academic post-compulsory schools (Shavit and Müller 2000), or also as a key tool for training-based active labour market policies, which might help those who did not get a good education in their youth to recuperate and to get access to good jobs, thus overcoming the "skill barrier" which keeps out people with low educational titles from most of the good dependent jobs (Esping-Andersen et al 1994).

In the current literature, cross-cutting economics, sociology, political science and management science, a number of comparative schemes have been proposed to look at the variety of VET systems. While such literature has in general confirmed the importance of a strong skills base for economic competitivity and development, it has also underlined the comparative heterogeneity not only of VET systems (Regini 1997), but also as of their historical trajectories and their relations to the economy (Culpepper and Thelen 2008; Thelen and Kume 1999).

1.1 A comparative framework

Comparative studies have shown that the definition of an analytical scheme enabling a systematic and detailed comparison of different VET systems, as well as of their socio-economic embeddedness, requires to take into account the behaviour of the two groups of actors who are by definition involved in the production of skills for a market economy: the State on one side and the firms on the other side (Busemeyer and Trampusch 2012). Both the State and the firms might be more or less involved in the production of skills, and by crossing

the two variables we get the four-cell table shown in table 1.1, with one type of VET arrangement in each cell. The Busemeyer-Trampusch typology (henceforth BT) is more articulated than a previous comparative scheme, devised by Regini (1997), which distinguishes skill production systems based on *appropriateness*, that is with a low investment, from systems based on *redundancy*, that is with a high level of investment. In the BT case, however, the typology is not built with reference to the *outcomes* of the system, but to the *behaviour of the actors* who are part of it.

Table 1.1. A typology of skills production systems

		Firms' investiment in initial training	
		Low	High
State investment in the production of skills	High	Statist systems (France, Sweden)	Collective systems (Germany)
	Low	Liberal systems (USA)	Segmented systems (Japan)

Source: Busemeyer e Trampusch (2012), tab. 1

Having table 1.1 as our reference, we move now to the definition of the four types of skills production systems, identifying some national cases as representatives of each type. We will then place Italy's VET and, more importantly, its evolution over time in this typology. Of course, empirical cases turn often out to be some mix of different ideal-types, and this is all the more true in our case, where a national VET might include very heterogeneous courses and institutions. As the discussion of the Italian case will show, what is actually found in each country is a mix of the different ideal-types, and when we classify a given country into one of the types it has always to be kept in mind that this classification refers to the *prevalence* of the type in the national VET.

1.1.1 Statist systems

The top cell on the left includes *statist* systems, where the public actor is at the center of skills production. Statist systems show a strong investment in VET courses regulated and managed by the state as an integral part of the general education system. In fact, parts of the VET systems might be partially externalized to private agencies and institutions, but they have to conform to the institutional design provided by the state. The French case is usually considered as typical of a statist approach to VET, but Sweden and other Scandinavian countries (with the exception of Denmark) are also included in this type[1], and also the Mediterranean countries might to some extent be classified here (more on this later).

Statist systems are school-based[2]. Both secondary and post-secondary school provides a number of vocational paths, separated from the academic ones but typically related to them via horizontal passages which enable people to move from the vocational paths to the academic ones and *vice versa*. Such passages weaken the separation between academic education and VET and make pupils' choices more flexible, avoiding the creation of some kind of 'educational ghetto'. What is important, from this point of view, is the probability to access university for pupils coming from VET, so that initial choices, which might be made

[1] Some authors (e.g. Bosch 2010) distinguish two different school-based models: one for the Continental countries, another for the Scandinavian ones, which is defined "solidaristic" because of its close relation to social policies.
[2] Another theoretical distinction often used in the literature separates "school-based" from "firm-based" approaches to VET (Streeck 1991; Soskice 1993).

without reliable information concerning the pupils' skills and motivation, might be reversed over time.

In such a system, firms and other labour market actors are not directly included as such. They might, however, contribute to the training processes by providing internships (which are separated from classwork) and by using the credentials awarded by the system in their personnel hiring. In both cases, it is a low-cost and high-benefit contribution on the part of firms, who partially avoid personnel selection costs and, more importantly, reduce the costs of initial training, since newly hired workers already possess at least a part of the required skills thanks to their vocational training. From the point of view of those who exit school or university, the school-to-work transition is made easier by the information associated to qualifications and by the bottom-up relations which typically exist between schools (or universities) and firms.

As will be discussed later for the Italian case, such bottom-up, local-level relations between firms and schools are extremely important, since they guarantee an effective involvement of firms and other labour market actors in the VET system. In turn, such an involvement makes it possible for firms to give precedence, in their hiring process, to qualified candidates. In this way, the value of the qualification is magnified and made explicit, so that families and pupils making their school choice include the occupational value of the title in their more or less conscious cost-benefit calculations. Local-level, decentralized involvement of firms in vocational schools might then be found also in countries where the prevailing regime is a different one.

1.1.2 Liberal systems

The left bottom cell defines *liberal* systems, where neither the state nor firms invest heavily in the production of skills. In such systems, exemplified by the US, and by Ireland and the UK in Europe, the production of skills takes place in the general school system, whose curricula are mostly academic. In secondary schools there are no major vocational paths, only a number of specialized courses which are clearly less prestigious than the academic paths, so that they cannot attract nor the best students neither the best teachers.

The state supports the school system providing funding and regulating the activity of private schools (which are, in any case, a minority), but its activity stops there. Firms, in turn, are not incentivated towards a redundant investment in the initial training of their workers, since they rely on hiring skilled personnel among upper secondary and university graduates and then giving them an on-the-job training. The school-to-work transition is then a market-type matching process: workers, or at least a part of them, are provided a strong skill base by schools or universities, from both the technical and the social point of view: firms just have to build on such a base. The school-to-work transition and firms' human resource development are then based on market-like mechanisms, creating a system with strong flexibility and adaptability.

1.1.3 Collective systems

In both the statalist and the liberal model there is no strong investment on the part of firms on workers' initial training. To the contrary, the right column of table 1.1 includes two skill regimes where a high investment on the part of firms is found. In the top right cell are found *collective* systems[3], with a strong investment in the production of skills on the part of both firms and the state. Collective systems are typically exemplified by Germany but also include most countries of Western Central Europe, such as Austria, Switzerland, the Netherlands and Denmark. The term comes from the key role in the management of the system of labour unions and business associations, both collective actors, thus ensuring a full involvement of

[3] Other authors call this model *solidaristic* (Thelen e Kume 1999), risking some confusion with the use of the same term for Scandinavian school-based VET systems (see previous note).

workers and firms in the production of skills. In collective systems the production of skills is supported by a strong investment from the state, as in statist systems, but this investment is paralleled by a strong investment on the part of corporatist associations (Schmitter and Streeck 1985).

However, the key characteristic of collective VETs lies in its *dual* nature: indeed, often the expression "dual system" is used to define such systems, indicating the fact that training takes place in both the firm and the school. The key feature of the system is indeed the fact that VET students do not enroll into vocational schools, as it happens in school-based systems, but are hired by firms as salaried apprentices, and divide their time, usually but not always on a weekly base, between their job and a school-based training program strictly connected to their job.

1.1.4 Segmented systems

Finally, in the bottom right cell, *segmented* systems are found, typically exemplified by Japan. In such systems, firms have a key role in the production of skills, by means of a strong investment in their workers' initial training. As it is well-known, basic workers' rights, such as job stability and protection against injust firing, are not provided by laws and state regulations, as it happens in Europe and in Northern America, but are provided by firms on a voluntary base, following social norms which are not formalized. Firms are constrained by such social norms, even in the absence of formalized sanctions. A part of this tacit agreement between firms and workers concerns initial training and life-long employment. Firms bear the costs of training but workers guarantee they will not leave, when fully qualified, towards a higher-paying competitor. Initial training is thus heavily firm-specific, also in those cases when external providers and training agencies are involved in the process.

School curricula in Japan are mostly academic, and in comparison to Europe and Northern America they might look quite conservative, with a strong emphasis on traditional culture and writing, but school performance has a strong role, with no comparison outside of Asia, in the school-to-work transition system, the so-called "*Jisseki Kankei*". Firms, in particular big ones, are in stable relations with local shools, and yearly ask the school to provide candidates to a given number of positions. Candidates are then selected on the basis of their school marks, and most of them are then hired, after being interviewed by the firm (Rosenbaum and Kariya 1989). The system favours school motivation and effort, with later beneficial consequences on the job performance.

It might be useful to add that the traditional strategy of internal training on the part of big corporation all over the world is quite similar to this system: up to the 90s, most upper secondary school and university graduates hired by a big corporation, such as IBM, for instance, would spend most of his/her early months in the new job in training programs, often within residential, campus-like facilities usually called *corporate university* (Ballarino 1998).

Table 1.2 synthetizes the core elements of the four models, distinguishing three ideal-types of skills, on the basis of the width of their possible use: *academic-general* skills, which are typically learned in school and might be used in all work settings, such as writing skills, general culture and so on; *vocational* skills, sometimes also called *occupational* or *trade* skills, which are associated to a specific occupation or job, are typically learned in vocational schools and might be used in all firms where the specific occupation is required: for instance, programming skills for an IT professional, or cooking for a cook; *firm* skills, which are idiosyncratic to a single firm and are learned on the job: for instance, the firm-specific processes of personnel management for an HRM professional, or the firm-specific machine tools for a specialized worker in a manufacturing firm. The last column to the right, moreover, relates the four types to their societal outcomes in term of inequality, following further work by Busemeyer (2015).

Table 1.2. Main features of the four types of skill production systems

type	core actors	core institutions	core skills	strongpoints	weakpoints	inequality outcomes
Statist	state, schools	technical-vocational school paths	academic and occupational	integration between school and VET	academization trend of the VET, with weakening relation between schools and firms	low
Liberal	schools, firms	academic schools, "on-the-job" firm training	academic and firm-specific	flexibility	full academization of the school system, de-qualification of mid- and low-qualified workers, offshoring of manufacturing	high
Collective	workers' and firms' associations, state, schools	dual system (integration between school- and firm-based training)	occupational	high average level of skills among the workers	rigidity, implying possible slow adaptation to changes in skill demand	low
Segmented	firms, schools	initial training in the firm (*corporate university*)	firm-specific	strong links between worker and firm	informality, implying possible opportunism on the part of firms	intermediate

Source: own elaboration from Busemeyer e Trampusch (2012) and Busemeyer (2015)

1.2 Where lies Italy?

To this day, only two studies have looked at the Italian VET in a systematic cross-national comparison. The pioneering study by Regini (1996; 1997) and collaborators (Colombo and Regalia 1996), recalled above, placed it among those systems oriented towards *appropriateness*, as distinguished from those oriented towards *redundancy*. Indeed, the study showed a low level of investment in school-based vocational training, as well as a reactive stance of firms with respect to skills provision: most of the Italian firms invest in skills only as a reaction to market changes, not as a proactive strategy. According to the BT typology discussed above, this would mean to classify Italy in the *liberal* type of VET, with low investment in the production of vocational and occupational skills on part of both firms and the state. In liberal VET systems, as we have seen, school produces a rich base of general-academic skills. Vocational paths might be present, but they are marginal in the general economy of the educational system, and refer to specific and limited occupations. Firms hire workers after school or university graduation, and they build on the job the skills they need, according to a reactive stance and without any investment in initial training programs with a relatively long temporal orientation.

A further study conducted by Ballarino (2013) substantially confirmed Regini's conclusion using both quantitative macroeconomic evidence and the results of a number of micro-level surveys concerning the skills strategies and behaviour of schools (Ballarino 2008; 2014), firms (Ballarino and Perotti 2011) and the labour market outcomes of vocational training graduates. It has to be noted, however, that the Italian socioeconomic system does profoundly differ from those of liberal countries such as the UK and the US. Indeed, the current literature on the *varieties of capitalism* usually classifies Italy among the *coordinated market economies* (Hall and Soskice 2001) or among the *mixed market economies* (Molina and Rhodes 2008), but not among the *liberal market economies* (LMEs).

Indeed, Italy lacks at least two major features of LMEs who are complementary to a market-based regime of skill production, without stable systematic connection between schools and the labour market: first, both the UK and the US host a higher education system which attracts bright students from the whole world and then turns most of them into highly skilled workers available to local firms, both national and multinational; second, both countries show a relatively high degree of labour market and entrepreneurial flexibility, in turn enabling the development of a wide market for high-skilled labour as well as a frequent inter-firm circulation of qualified human resources. The two features of interest are among the core requirements for the production model based on *radical innovation* characterising the UK and the US, based on highly qualified human resources working in innovative and high-tech industries such as ICT, military and bio-technologies (Hall and Soskice 2001).

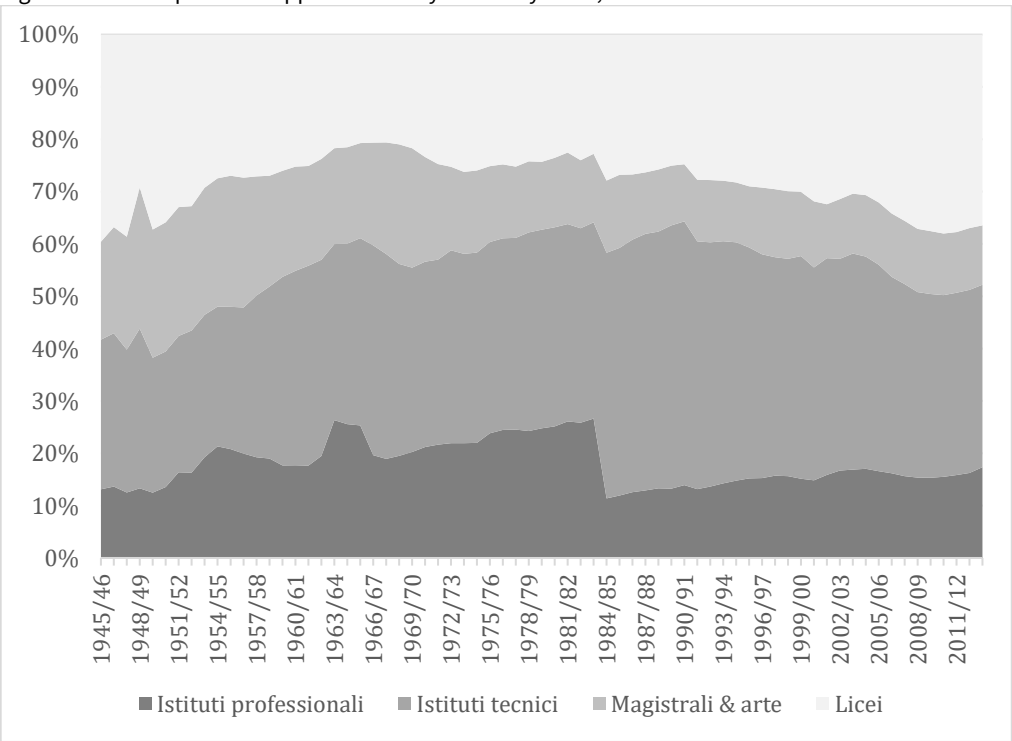
No one of such features is present in the Italian socioeconomic regime. Italian universities, despite attracting more foreign students now than one or two decades ago, do not even compare with the Anglo-Saxon ones in this respect, while the Italian productive system is characterised by a high frequency of manufacturing firms in technologically mature industries, who rely more on *incremental* than on radical innovation, by a relatively rigid labour market, and by a variety of local industrial districts exporting their products abroad (Burroni and Trigilia 2009; 2012). Then, a question arises: how it is possible for a VET system to be that deconnected from other features of the Italian socioeconomic regime?

An answer to this question can be found by enlarging the historical perspective. It has thus to be remembered that Italy used to have a fairly good and effective school-based VET system, with two main branches at the secondary level: the *istituti tecnici*, with also an academic component and allowing access to some technical university field, and the *istituti professionali*, more vocationally oriented. Increasing participation to both paths was seminal in the huge expansion of secondary education which characterized Italy's post-WW2 development, creating the basis for the Italian *miracolo economico* which in a few decades turned Italy from a mostly agricultural country into one of the major global industrial powers,

and in the process substantially decreased educational inequalities, particularly in the more advanced Northern part of the country (De Rita 2007; Ballarino, Panichella and Triventi 2014).

However, since the 70s major changes took place with respect to this system. Figure 1.1 below shows how technical and vocational schools began losing students in the 80s. The graph shows the academic share of upper secondary students to have an inversed U-shape, falling after WW2, and growing again since the 80s. In order to accommodate to this trend, subsequent curricula reforms have reduced the weight of occupationally-oriented training to the advantage of academic teaching, in particular in the *istituti tecnici*, which currently should be seen, on aggregate, more as an academic than a vocational track (Ballarino 2013). Unfortunately the OECD figures on vocational training take the name of these schools at its face value, so that the figures provided by a number of international comparative studies by authors without a direct knowledge of the Italian education wrongly suggest it to have a relatively strong school-based VET system (e.g. Bol and van de Werfhorst 2012).

Figure 1.1. Participation to upper secondary school by track, 1945-2014



Source: own elaboration on Miur and Istat data (figures compiled and provided by N. Panichella, university of Milan)

Historical analysis shows this situation to be the outcome of a long process of institutional change (Torresani 2013). The key episode took place in 1973-74, when a general reform of school governance changed deeply the governance of technical and vocational schools. While beforehand they were managed by a school principal named by the ministery and by a managing committee including representatives from local firms, after the reform the latter committee (which did not exist in academic schools) was abolished, and substituted by committees representing students, parents and teachers, designed in the same way over all school tracks. Thus, while the purpose of the reform, inspired by radical democratic values and supported by left parties and by the unions, was to increase social participation to the management of schools, its actual result was the elimination of the major institutional channel of communication between technical-vocational schools and the labour market.

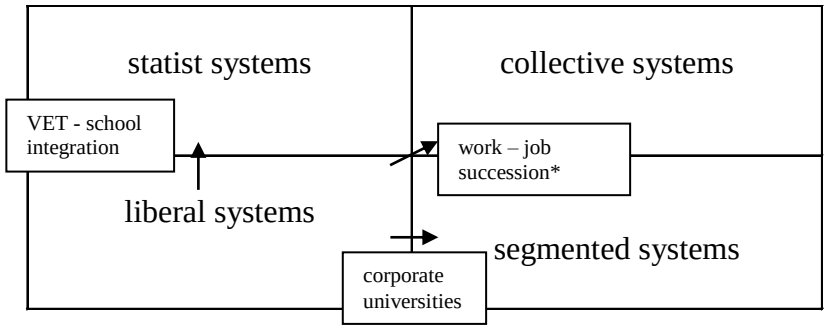
Since the 90s, then, a consensus emerged among most scholars and policymakers interested in the Italian VET concerning its limits and inadequacies, in particular concerning the weakness of its relation to firms and the labour market. According to the opinion of many, such an under-investment in skills is related to the low productivity growth and to the increasing income inequality characterizing the Italian labour market since the early 90s. While this report lacks space for a detailed description of the many reforms who tried to

intervene on the issue, it might be useful to briefly survey the possible direction the system might take in the next years.

1.3 Perspectives of change

Work on the current situation of the Italian VET system shows a number of trends of change which might be seen as different (sometimes competing) answers to the issue of the weak link between schools and labour market. Table 1.3 shows how these trends might be brought back to the BT scheme (tab. 1.1), which is reproduced in the table with the addition of three arrows corresponding to as many trends of change.

Table 1.3 Trends of change in the Italian skills production system



Note: see previous tables for the definition of the cells

Theoretically, the picture is quite simple. The three arrows added to the table represent movement away from the liberal system, located in the bottom right cell, towards the three remaining ones.

1.3.1 Towards a segmented model?

Going towards the top, a strengthening of firm-provided initial training, according to the *corporate university* model, pushes the system towards the segmented model.

As we have seen, the key actors of the segmented model are firms, particularly big corporations: in Japan, corporations directly relate to local schools for recruitment and selection, and afterwards they massively invest in the initial training of their personnel, often inside own campus-like specialized facilities (corporate universities). However, such a model is hardly feasible in contemporary Italy, since the country's productive structure is characterized by the prevalence of small and medium firms, who in most of the cases cannot afford a redundant investment in the skills of their own workforce, nor can they afford the costs of establishing and maintaining stable relations with schools. The few big corporations, national or multi-national, hire mostly university graduates, so in most of the cases they are not very interested in vocational upper secondary graduates. More in general, most corporations are currently under an increasing competitive pressure, so that they are often trying to reduce those costs related to investment in redundant skills. In Japan itself, it appears that the "*Jisseki Kankei*" system does not work anymore for the majority of Japanese youths (Brinton 2010).

However, the core feature of the segmented model, that is a direct relation between schools and firms at the local level, is often found by studies of specific areas or industrial sectors: for instance, a research on Tuscany was able to find out a number of what we called "local dual systems", i.e. contexts in which a strong relation between schools and firms managed to substantially involve the latter in the establishment of vocational courses strictly tailored to their skill needs (Ballarino 2014). Public policies developed since the early 2000s have stimulated the establishment of this type of joint ventures, which are now widely popular among school personnel, contrary to the past.

1.3.2 Towards a collective model?

Since the 90s, the collective model, and in particular its German version, has been the main benchmark for Italian scholars, observers and policymakers with an interest in a reform of VET who could make it more attuned to the skill demand coming from the labour market. However, often actual policies were not going in that direction. For instance, the grand university reform of the late 90s, which introduced the two-tier structure required by the Bologna process, did not do much to open course design to the participation of external actors, as firms or business or employers associations, and abolished two-year vocational tertiary courses (*diplomi universitari*) who had fared pretty well since their establishment in the 80s (Ballarino 2015b).

In the following decade, both centre-left and centre-right governments tried to move the Italian VET towards the dual model by means of a number of policies. First, the *alternanza scuola-lavoro* should be mentioned, an ambitious national program started in 2003 to provide effective internships to upper secondary students, which was gradually extended to become compulsory for all students during the final three years, not only in the technical and vocational tracks but in all schools, including the academic ones. Although the name of the program means "work and school alternation", that is a system equally based on both according to the example of the dual system, actually internships remained only partially integrated with classwork. However, the diffusion of the program and the funding it provided helped schools in establishing links to firms.

A second policy initiative was the relaunching of the regional vocational training, which had been created in the late 70s in order to systematize a number of local training programs, both initial and continuing, but it had then turned out to be a "second division school" for those pupils unable to progress in the standard technical and vocational courses (Colombo and Regalia 1996; Ballarino 2013).

Some regions, in particular the richer regions of the North, Lombardia in particular, invested substantially in the regional VET system, heralding it as a first step towards a dual system, but the distance from the German benchmark is too clear for such claims to be taken seriously (Ballarino 2013). First, the scale is totally different: while the German system recruits yearly about 2/3 of each cohort of upper secondary students, in Lombardia the regional VET system includes about 13% of upper secondary schools. Second, the selection process bringing students into the two systems is totally different: while in Germany the dual system is being extended towards the tertiary level, in Italy the dual system is still a second-best choice for low performance students. Third, while some degree of involvement of business associations and trade unions has been reached, in particular concerning the former, there is yet no sign of the establishment of the systematic and continuing relation which forms the institutional backbone of the German dual system. Finally, and perhaps more importantly, the current regional VET system (as well as the national one) lacks the key feature of the dual system, the hiring of the student as an apprentice on part of the firm, which is the main incentive offered by the dual system from the perspective of students.

1.3.3 Towards a statist model?

Italian observers, scholars and policymakers interested in a reform of the Italian VET oriented towards the German dual model have often counterposed the latter to academic schools. However, the key feature of the dual system is its integration into the school system (Ballarino and Checchi 2013). Given the current attitudes and choices of Italian families and students, a too strong separation between vocational training and the school system would put the former at risk of remaining a second-choice school, more similar to a remedial track than to an excellence track producing up-to-date skills as required by the labour market. It is thus likely that the best way forward for the Italian VET would be a comeback to its past,

that is a renewal of the technical and vocational paths bringing them back to their original vocation by establishing closer links between schools and firms.

As written above, the main feature of the statist system according to the BT model is a key role for the state, who provides much of the investment in skills and thus compensates for the lack of investment on part of firms. This makes it attractive for Italy, since the majority of Italian firms can hardly increase their current investment in skills, mostly because of their average small size but also because of competitive pressure on costs and, not least, because of cultural limits on the part of the entrepreneurial class. Of course no choice comes for free, since the Italian State, given the financial constraints it faces after the debt crisis of the early 2010s, should move resources to the VET from other policy sectors, such as healthcare or pensions.

A second good reason for an integration of VET in the school system comes from research on skill demand (Ballarino and Perotti 2011). Indeed, results from survey of employers show that only a minority of firms are interested in the type of occupational skills provided by a dual system on the German model. What Italian firms ask for is on one side a school degree reliably certifiying the learning potential of their possible employees, and on the other side the possession on their part of a set of social and relational skills needed in order to be effectively and rapidly inserted in the organization of the firm and in its hierarchical processes. From the supply side, this would mean integrating school and vocational training in a proportion that may change depending on the specific skills to be taught and on the characteristics of local labour market demand. Inside such an integrated system, local dual systems might also be created when the local conditions allow it, in particular concerning the participation of firms.

2. ITS in Italy: the figures

This section aims at giving a detailed picture of the ITS courses in Italy, describing their diffusion, the composition of their student body, their educational and employment outcomes and their relationship with the labour market. By using the main available data on ITS collected by INDIRE (*Istituto Nazionale Documentazione Innovazione Ricerca Educativa*), we study: a) how ITS foundations and courses are distributed over Italian regions and fields of study, b) how students are distributed in terms of gender, age and school background, c) how many of the enrolled students get the final ITS degree, d) the employment outcomes of the ITS graduates, both in quantitative and qualitative terms, and e) how ITS courses are related to the labour market, using the number of instructors external the school and the number of activated internships as the main indicators.

After describing the data and the analytical strategy (par. 2.1), the section presents empirical evidence concerning the main characteristics of ITS foundations and courses (par. 2.2); the composition of the enrolled students (par. 2.3); the educational attainment and achievement (par. 2.4); the employment outcomes (par. 2.5) and, finally, the relationship between ITS and the labour market (par. 2.6).

2.1 Data from INDIRE and analytical strategy

The data used in this section are taken from the national database managed by INDIRE, the oldest research department in the ministry (MIUR: *Ministero dell'Istruzione, dell'Università e della Ricerca*) and a key institution for Italian education research. Among its activities, INDIRE constantly implements and manages the national database on ITS – established with the DPCM 25/1/2008 –, which currently includes information collected by the ITS foundations regarding all the ITS courses activated in Italy until 2018[4].

We focused only on those courses activated from 2010 (the first year available) to 2017, excluding those activated in 2018 in order not to underestimate the total number of courses started in that year, since 2018 had not finished yet at the moment of data collection and analysis. Further selections were applied when we studied educational and employment outcomes and the relationship between ITS and the labour market (see below).

The analytical strategy was divided in two main steps: first, we analysed the ITS courses *on average*, in order to give a general picture of courses, students, outcomes, and so on. Then we studied the trend *over time*, distinguishing courses according to the starting year. In the first step we studied differences across geographical distributions (North-West, North-East, Centre, South and Islands[5]) and fields of study (Energy efficiency; Sustainable mobility; New technologies for life; New technologies for Made in Italy products; Information and communication technologies; Innovative technologies for cultural heritage and tourism). These differentiations are not presented for the second step of the analysis, because of both small sample size and sake of brevity.

[4] INDIRE also yearly implements a national monitoring on all the ITS courses finished two years before (e.g. the national monitoring in 2017 analysed the ITS courses finished from January 2015 to December 2015). The national monitoring not only studies the main characteristics and outcomes of the ITS courses, but also analyses the five indicators of achievement and outcome described in the *Accordo CU August 2014* (attractiveness, employability, professionalization, active participation and inter-regional networks) and translates them in a score for each course (0-100). This is crucial since ITS courses are entitled to receive premia if the score is above a certain threshold.

[5] Following the categorization used by Istat, Liguria, Lombardia, Piemonte and Valle d'Aosta are the North-western regions, Emilia-Romagna, Friuli-Venezia Giulia, Trentino-Alto Adige and Veneto are the North-eastern regions, Lazio, Marche, Toscana and Umbria are the Central regions, and Abruzzo, Basilicata, Calabria, Campania, Molise, Puglia, Sicilia and Sardegna are the Southern regions.

Applying this synchronic and diachronic perspective, we first studied the main characteristics of ITS foundations and courses (distribution over regions and fields of study) and the composition of enrolled students (by age, gender and upper secondary school background), focusing on all the courses activated between 2010 and 2017. Then we analysed the educational attainment, namely the percentage of ITS graduates, distinguishing by gender, and the final mark, focusing only on finished courses. Since the information on whether or not the course finished was not available in the data, we assumed that the course had finished if the number of graduates was higher than zero.

Then, we studied the employment outcomes of ITS graduates one year after graduation, focusing on the quantity (e.g. percentage of employed, by gender etc.) and the quality of employment (e.g. percentage of jobs consistent with studies, percentage of permanent contracts etc.). Here, we analysed only ITS courses started until 2014: if we assume that the duration of most courses is two years – since we had not precise information on the duration – and the employment condition is collected one year after graduation, those courses started from 2015 may not be finished, or too short a period has passed from graduation in order to reliably observe the graduates' occupational condition.

Finally, we investigated the relationships between ITS courses and the labour market, using the number of instructors external to the school and the number of activated internships as the main indicators. This information is mandatory to collect, since the law claims that at least 50% of the instructors in ITS courses have to come from the labour market and at least 30% of hours have to be spent in on-the-job training (DPCM 25/1/2008, art. 4). Also in this case, we focused on finished courses, in order not to underestimate the number of external teachers and internships.

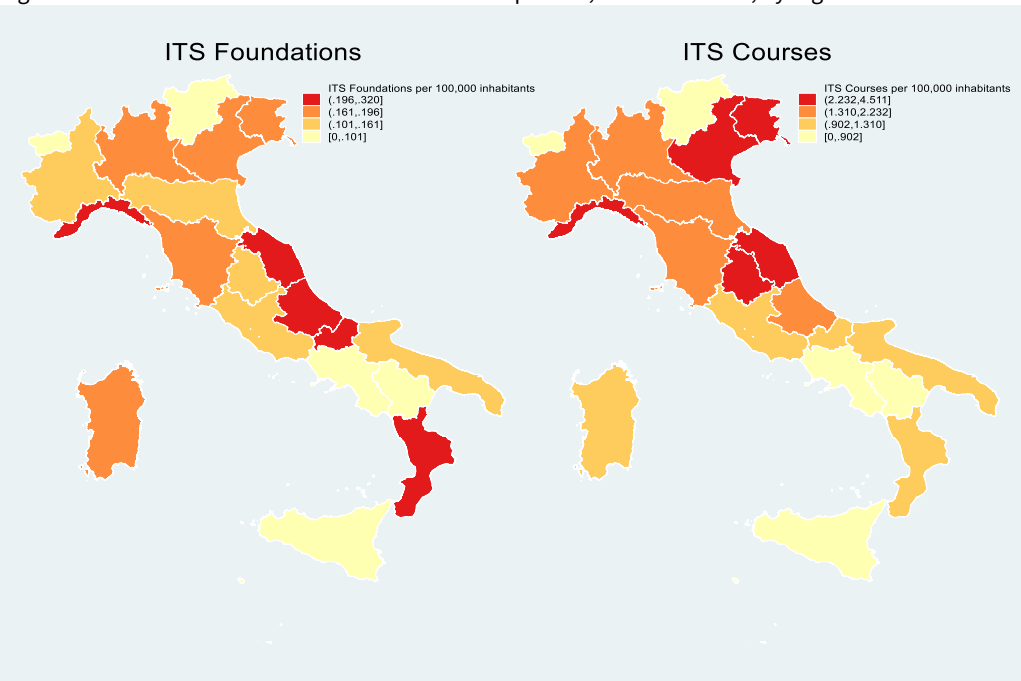
2.2 The main characteristics of the ITS

Figure 2.1 shows the distribution of ITS foundations (left panel) and courses (right panel) across Italian regions, measured through the number of foundations and courses per 100,000 inhabitants. Red and dark orange regions are those with a higher rate of ITS, whereas light orange and yellow regions have a lower number of ITS compared to their own population.

The two panels of the figure are very similar, especially if we look at the regions where ITS foundations and courses are less widespread (Valle d'Aosta, Trentino Alto Adige, Campania and Sicilia). The regions with the highest number of both foundations and courses per inhabitant are Liguria in the North-West (4 foundations and 71 activated courses, equal to a rate of 0.25 foundations and 4.5 courses per 100,000 inhabitants), Veneto (9 foundations and 119 courses, rates of 0.18 and 2.43) and Friuli-Venezia Giulia (2 foundations and 43 courses, rates of 0.16 and 3.52) in the North-East, Marche (4 foundations and 40 courses, rates of 0.26 and 2.59) in the Centre and Abruzzo (4 foundations and 26 courses, rates of 0.30 and 1.97) in the South. More in general, the map of Italy clearly shows that the ITS are more widespread in Northern and Central regions – with the exceptions of Valle d'Aosta and Trentino Alto Adige, which have never created an ITS foundation or an ITS course[6] – than in Southern regions – with the only exception of Abruzzo. It is worth noting that a map based on regional development indicators would not be very different from this one, sharpely divided between a developed North and Center and an underdeveloped south (Ballarino and Schadee 2005).

[6] This depends on the fact that both are small autonomous border regions, including substantial linguistic minorities, who have developed an effective regional vocational training system (*Istruzione e formazione professionale regionale*) which made the establishment of ITS less attractive to local policymakers and companies. In particular, the province of Bozen, which includes the German-speaking part of Trentino-Alto Adige, has a provincial dual system modelled according to the German benchmark.

Figure 2.1. Number of ITS Foundations and courses per 100,000 inhabitants, by region



Source: own elaboration on INDIRE (2018) data

Table 2.1 presents the distribution of ITS foundations and courses according to geographical area and field of study. Before studying how ITS from different fields are distributed across macro-areas, it is interesting to look at the total number of foundations and courses. 91 ITS foundations have been created and 918 ITS courses have been activated from 2010 to 2017, with the highest percentage in the field of New technologies for Made in Italy products (37.4% of the foundations and 43.6% of the courses) and the lowest percentage in the field of New technologies for life (6.6% of the foundations and 6.3% of the courses)[7].

Table 2.1. ITS foundations and courses (%), by geographical distribution and field of study

Geographical distribution	Field 1	Field 2	Field 3	Field 4	Field 5	Field 6	*Total*
	ITS Foundations						
North-West	13.8	10.3	6.9	37.9	17.2	13.8	*29*
North-East	11.1	22.2	11.1	33.3	11.1	11.1	*18*
Centre	11.1	11.1	5.6	50.0	5.6	16.7	*18*
South and Islands	19.2	26.9	3.9	30.8	7.7	11.5	*26*
Total	*14.3*	*17.6*	*6.6*	*37.4*	*11.0*	*13.2*	*91*
	ITS Courses						
North-West	7.7	25.2	6.5	41.6	13.9	5.2	*310*
North-East	11.1	12.3	6.0	44.8	11.5	14.3	*252*
Centre	11.2	10.1	8.9	53.9	4.7	11.2	*169*
South and Islands	16.0	25.1	4.3	35.8	5.9	12.8	*187*
Total	*11.0*	*18.9*	*6.3*	*43.6*	*9.9*	*10.4*	*918*

Source: own elaboration on INDIRE (2018) data

Note: Fields of study are Energy efficiency (field 1), Sustainable mobility (field 2), New technologies for life (field 3), New technologies for Made in Italy products (field 4), Information and communication technologies (field 5), Innovative technologies for cultural heritage and tourism (field 6).

The table shows that fields of study are differently distributed across geographical areas. For instance, foundations and courses in the field of New technologies for Made in Italy products are more widespread in the Centre of Italy than in other areas: among the foundations and courses activated in Central regions, about a half concerns this field (50.0% and 53.9%, respectively), whereas in other regions this proportion is much lower, especially in the South (30.8% and 35.8%, respectively).

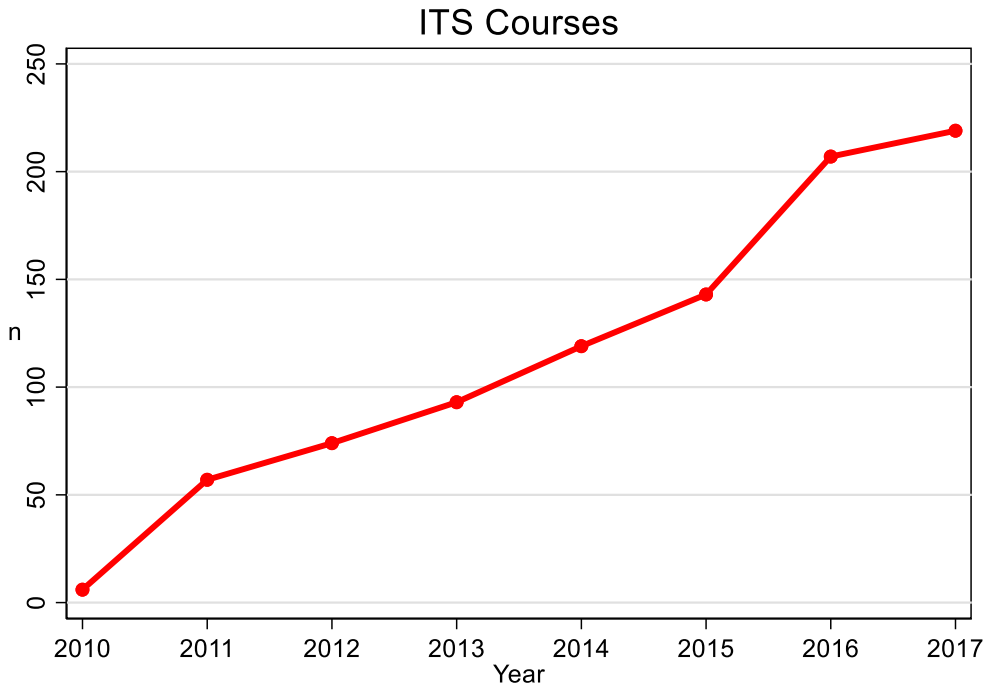
[7] A low number of ITS foundations activated courses in more than one field of study. For these foundations we considered the 'prevalent' field of study, i.e. the field in which the highest number of courses was activated.

The diffusion of foundations and courses in the field of Information and communication technologies is higher in Northern regions, especially in the North-West (17.2% and 13.9%, respectively), whereas the field of Energy efficiency is more widespread in the South than elsewhere (19.2% of the foundations and 16.0% of the courses). Southern and North-western regions activate the highest number of courses in the field of Sustainable mobility (25.1% and 25.2%, respectively), whereas foundations in this field are more frequent in the South than in the North-West (26.9% and 10.3%).

Differences are smaller in the fields of New technologies for life and Innovative technologies for cultural heritage and tourism, although the percentage of foundations created in the former is comparatively higher in North-eastern regions (11.1%) and the percentage of courses activated in the latter is lower in the North-western ones (5.2%).

Finally, figure 2.2 shows the number of ITS courses activated yearly from 2010 to 2017. One can clearly see that the number of ITS courses has dramatically increased over time, starting from only 6 courses activated in 2010 up to 219 courses activated in 2017, with a stronger increase between 2010 and 2011 (from 6 to 57) and between 2015 and 2016 (from 143 to 207). The first increase, between 2010 and 2011, was actually driven by the diffusion of the ITS from one single region (Liguria) and field of study (Sustainable mobility) to the whole spectrum of geographical areas and fields.

Figure 2.2. Number of ITS courses, by course starting year



Source: own elaboration on INDIRE (2018) data

Unfortunately, data limitations do not allow to observe a similar trend for the ITS foundations, since information on the year of creation of the latter is not available. However, if we use the starting year of the first course activated by each foundation as a proxy of the date of its creation, it is possible to note that a large proportion of foundations started in 2011 (45.1%) and a smaller proportion joined them in the following years (e.g. 15.4% in 2012, 14.3% in 2014 and 12.1% in 2016) (detailed results not shown). More specifically, around two thirds of the foundations were born in the first three years after the introduction of the ITS courses, while the remaining ones were created in the following years with some peaks every other year.

2.3 The composition of the students

Table 2.2 presents some information concerning the students enrolled in ITS courses, according to the geographical distribution and the field of study of the courses. First, each course has, on average, abound 25 students (24.49) and this figure does not change across macro-areas and fields of study. Although these are small numbers, they should not be taken as an indicator of the attractivity of the ITS, since most ITS courses have a fixed number of students to be admitted (*numerus clausus*). This is necessary because of the vocational nature of the courses, implying a dynamic and active teaching and on-the-job training for all the students. Indeed, around 85% of the courses host between 20 and 30 students, whereas courses with more than 30 enrolled students are very few (3.8%).

Table 2.2. Number of enrolled students, by geographical distribution and field of study

	Enrolled (mean)	Enrolled (total)
Geographical distribution		
North-West	24.03	7,448
North-East	24.39	6,146
Centre	24.35	4,115
South and Islands	25.52	4,772
Field		
Field 1	24.73	2,498
Field 2	24.35	4,213
Field 3	23.64	1,371
Field 4	24.23	9,692
Field 5	25.69	2,338
Field 6	24.94	2,369
Total	*24.49*	*22,481*

Source: own elaboration on INDIRE (2018) data

In order to investigate the attractivity of the ITS, it would be interesting to have information on the number of upper secondary school graduates who applied for an ITS course. Since this information is unfortunately not available in the data, we can take the total number of students enrolled in ITS courses as a kind of proxy, also breaking it down by geographical area and field of study. It has to be taken into account, of course, that the comparison is biased by the variation of the total number of courses activated in each area and field (see above) as well as by the size of the young population across regions. The second column of table 2, then, shows that ITS courses attracted 22,481 students between 2010 and 2017, with higher numbers in Northern regions (7,448 in North-West and 6,146 in North-East) and in the field of Sustainable mobility (4,213) and New technologies for Made in Italy products (9,692).

Table 2.3 presents further information concerning the composition of the students of ITS courses, namely their mean age at enrolment, the percentage of female students and their educational background. Individuals enrol in an ITS course when they are, on average, 22.87 years. If we consider that the average age at upper secondary school degree is 19.51 years (own analysis on data from Istat Multipurpose Survey – Family and Social Actors), it is likely that the average ITS student has had some other (failed or not) experience between the end of upper secondary school and the enrolment in the ITS, either in the labour market or in university. This is confirmed by the fact that the average age at enrolment of ITS students is higher in those contexts where the percentage of students coming from universities is higher, i.e. in Southern regions (age=24.38, percentage of students from universities=5.7%) and in the field of Innovative technologies for cultural heritage and tourism (age=24.16, percentage of students from universities=8.9%).

In general, however, the highest proportion of ITS students comes from upper secondary schools, primarily from the technical tracks (*istituti tecnici*), especially in the North-West (65.8%) and North-East (65.4%) and in the fields of Energy efficiency (79.4%) and Sustainable

mobility (82.5%), confirming that the ITS might be a "natural" tertiary outcome for young people with a technical diploma.

Table 2.3. Composition of enrolled students, by geographical distribution and field of study

	Age (mean)	% Female	% Liceo	% Techn.	% Vocat.	% Tertiary	% Other
Geographical distribution							
North-West	22.23	25.4	18.7	65.8	8.6	3.3	3.7
North-East	22.31	25.4	15.4	65.4	12.0	4.1	3.1
Centre	23.21	32.2	19.8	60.2	10.1	5.1	4.9
South and Islands	24.38	24.3	18.8	59.5	12.0	5.7	3.9
Field							
Field 1	22.94	10.2	9.5	79.4	7.5	2.3	1.2
Field 2	22.05	11.1	10.2	82.5	3.4	1.7	2.2
Field 3	23.60	32.7	26.3	56.8	8.7	4.7	3.5
Field 4	22.75	29.5	18.7	58.4	13.4	4.8	4.7
Field 5	23.08	19.7	27.4	52.8	11.3	4.5	4.0
Field 6	24.16	61.1	24.2	46.5	14.8	8.9	5.6
Total	*22.87*	*26.4*	*18.0*	*63.4*	*10.5*	*4.3*	*3.8*

Source: own elaboration on INDIRE (2018) data

The percentage of students from the academic track (*licei*) is higher in the fields of New technologies for life (26.3%), Information and communication technologies (27.4%) and Innovative technologies for cultural heritage and tourism (24.2%), where the proportion of students from the technical track is comparatively lower. Similarly, the percentage of students enrolled after a vocational diploma (*istituti professionali*) is higher in the fields of New technologies for Made in Italy products (13.4%), Information and communication technologies (11.3%) and Innovative technologies for cultural heritage and tourism (14.8%).

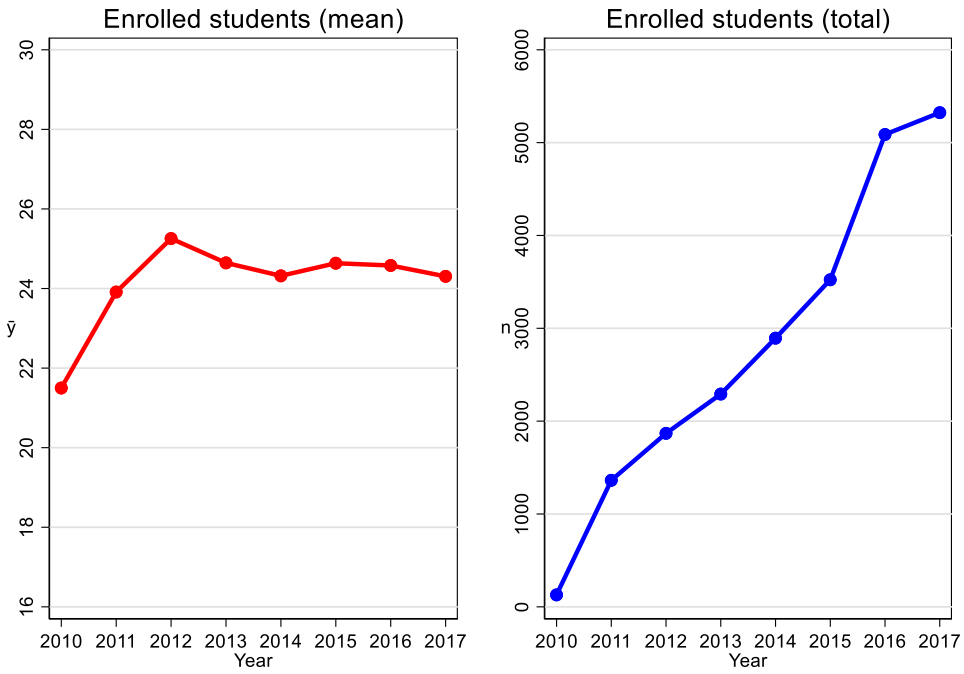
Finally, ITS courses primarily attract men, since women are only one fourth of the enrolled students (26.4%), but there are clear differences according to the field of study. For instance, there is only one woman out of ten students in the courses related to Energy efficiency (10.2%) and Sustainable mobility (11.1%), whereas there are more than six women out of ten students in the courses of Innovative technologies for cultural heritage and tourism (61.1%). This confirms that even in the ITS there is an unequal distribution of men and women across fields of study – already shown by scholars concerning the upper secondary tracks (Ballarino and Vezzoni 2007) and the university fields of study (Cantalini 2015) in Italy –, with the former more likely to enrol in courses in scientific and technical disciplines, and the latter more likely to enrol in courses in the humanities and in communication.

Figure 2.3 concerning the trend over time in the composition of students confirms that the number of individuals enrolling in the ITS dramatically increased from 2010 – when just 129 students attended six courses in the field of Sustainable mobility (see above) – to 2017 – when the students attending ITS courses activated that year were 5,323. We have to consider that this notable growth is, at least partially, driven by the increase in the number of courses, as also shown by the trend in the average number of students in each course, which increased from 2010 to 2012 but then remained stable around 24 individuals per course.

The composition of ITS students did not change much in terms of age, gender and educational background (Figure 2.4). The average age at enrolment increased by two years along the whole period (from 20.80 in 2010 to 22.89 in 2017), although the only relevant increase appeared between 2010 and 2011, partially driven by the growth in courses and number of students, affecting also their age composition: afterwards, age remained stable at about 22-23 years. Figures concerning gender and school background confirm this pattern: the percentage of women increased and the percentage of students from a technical school decreased especially between 2010 and 2011. In other words, the ITS student in 2010 was very likely to be a young man coming from the technical upper secondary school, whereas in the following years – thanks also to the diffusion of courses – the probability to find older

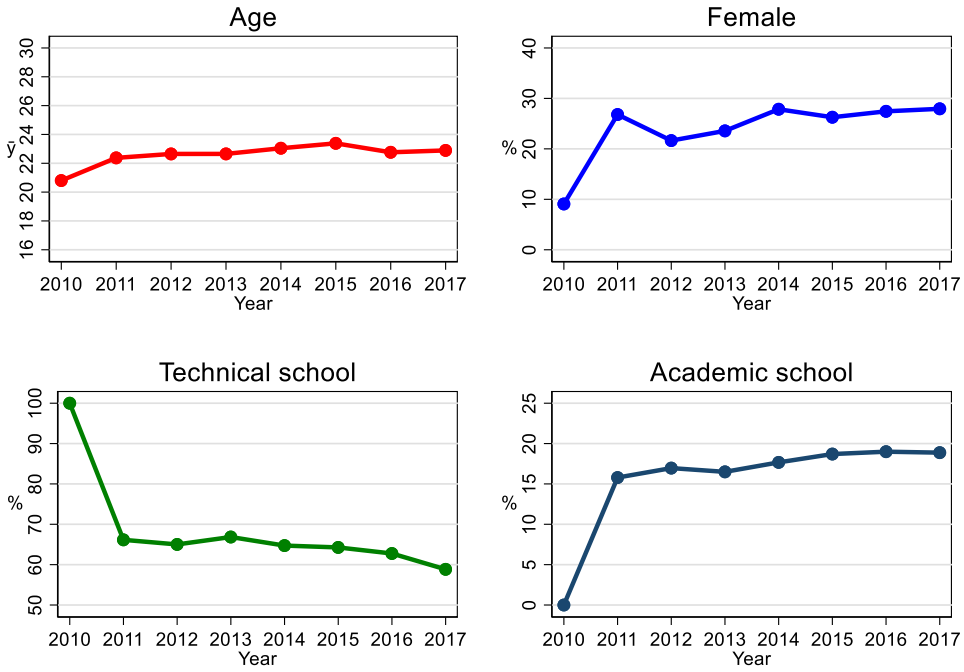
people, women and individuals coming from the academic (or vocational) track increased, making the ITS more heterogeneous in terms of students' composition. It remains to be seen whether this trend will continue in the next future.

Figure 2.3. Number of enrolled students, by course starting year



Source: own elaboration on INDIRE (2018) data

Figure 2.4. Composition of enrolled students, by course starting year



Source: own elaboration on INDIRE (2018) data

2.4 The ITS graduates

Table 2.4 shows that three students out of four get the final ITS degree (75.8%). Unfortunately, available data do not allow to investigate what happens to the non-graduated students (24.2%). In other words, it is not possible to know wether they did fail the final exam or were not admitted to it; neither it is possible to know whether they dropped out during the course because of personal problems or because they found a job.

The probability to graduate is notably higher in Central and Northern regions, especially in the North-East, where 81.3% of the students get the final degree, than in Southern ones (68.2%). Differences by field of study are smaller, although students in the field of New technologies for Made in Italy products have a probability to graduate that is 6.8 percentage points higher compared to the students in the field of Energy efficiency.

If we look at gender differences, men are slightly more likely than women to get the final degree (76.1% for the former and 72.2% for the latter), especially in the South – where 69.0% of men and 60.3% of women graduate – and in the North-East – where 81.4% of men and 75.7% of women graduate. Differences by field of study are also in this case smaller, although the probability to graduate is comparatively lower for men enrolled in courses related to Energy efficiency (71.0%) and for women enrolled in courses related to New technologies for life (66.6%).

Table 2.4. ITS graduates, by geographical distribution and field of study

	% Graduated	% Male graduated	% Female graduated	Final mark (mean)
Geographical distribution				
North-West	76.7	76.7	75.3	85.54
North-East	81.3	81.4	75.7	84.82
Centre	73.0	73.8	72.3	86.82
South and Islands	68.2	69.0	60.3	85.52
Field				
Field 1	70.8	71.0	70.4	83.79
Field 2	74.5	75.1	71.9	86.34
Field 3	72.1	73.8	66.6	89.00
Field 4	77.6	77.8	72.0	85.47
Field 5	76.5	76.3	75.0	85.18
Field 6	76.7	77.1	75.6	85.38
Total	*75.8*	*76.1*	*72.2*	*85.58*

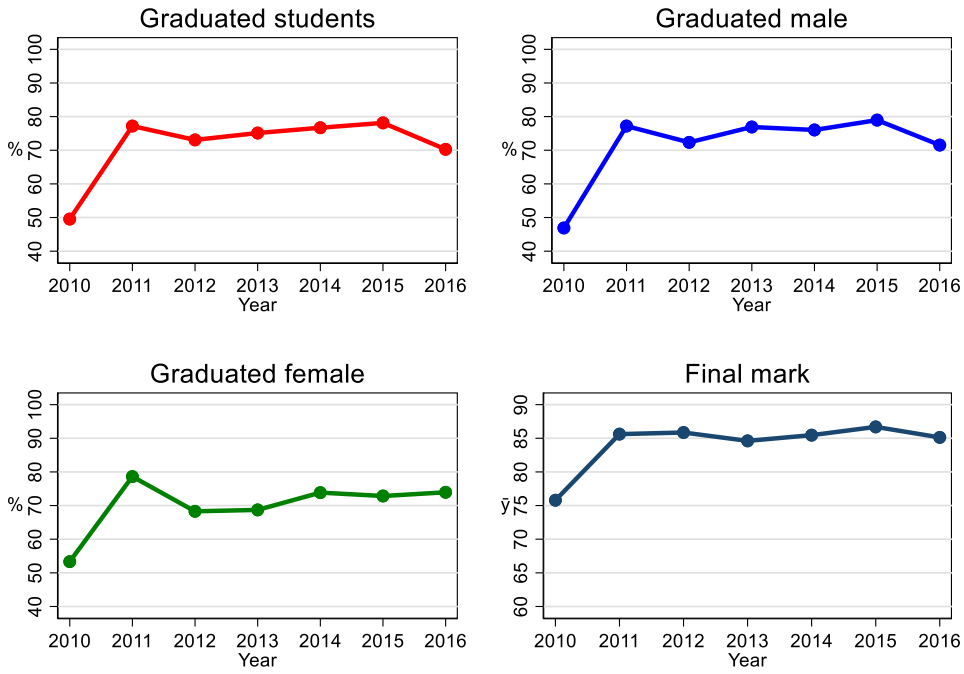
Source: own elaboration on INDIRE (2018) data

Finally, the average final mark is 85.58, on a scale ranging from 0 to 100, according to which the final exam is passed if the score is not lower than 70[8]. The final score is constant across geographical areas and fields of study, with the only exception of the field of New technologies for life, where students have an average mark of 89.00.

Trends over time show some improvement in students' attainment, primarily driven by an improvement between 2010 and 2011 (figure 2.5). The percentage of graduated students increased from 49.5% in 2010 (46.9% among men and 53.3% among women) to 77.2% in 2011 (77.2% among men and 78.6% among women) and then decreased – with some fluctuations – up to 70.3% in 2016 (71.5% among men and 73.9% among women). The average mark at the final exam increased by 10 points between 2010 (75.79 out of 100) and 2011 (85.62), and then was stable until 2016 (85.14).

[8] The final exam is divided in three tests: a theoretical-practical test prepared by the ITS foundation's technical scientific committee (maximum score: 40; threshold to pass: 24), a written test prepared by the Invalsi together with the *Conferenza dei Rettori delle Università Italiane* (maximum score: 30; threshold to pass: 18) and a colloquium concerning the project work developed during the on-the-job training (maximum score 30; threshold to pass: 18).

Figure 2.5. ITS graduates, by course starting year



Source: own elaboration on INDIRE (2018) data

2.5 The employment outcomes

Looking at employment outcomes in quantitative terms, table 2.5 shows that the probability of being employed one year after ITS graduation is very high and amounts to 77.5%. This value is actually underestimated, since it includes in the computation 11 courses activated in 2014 who currently have no employed students, but it is not clear whether one year had actually elapsed since graduation. If these courses are excluded, the probability of being employed increases up to 80.2%.

It is important to note that this figure is much higher than the corresponding figure for university graduates in the same period. For instance, surveys conducted by AlmaLaurea on the employment outcomes of university graduates from 2013 to 2017 – the same years in which employment outcomes of ITS graduates are observed – show that one year after graduation the percentage of employed people is only 44.0% (39.5% among bachelor graduates and 55.1% among master graduates) (Consorzio Interuniversitario AlmaLaurea 2018).

Among those graduates who do not work, a small proportion enrol to a university course (3.3%), with no substantial differences according to geographical macro-area and field of study.

As expected, the proportion of people employed one year after the end of the ITS course is higher in the North-East (83.4%) and North-West (80.6%) than in the South (68.2%). Concerning differences by field of study, the employment outcomes are especially high in the courses related to Sustainable mobility (80.7%) and New technologies for Made in Italy products (79.8%), whereas they are comparatively low in the courses related to New technologies for life (68.7%). This last finding is primarily driven by the very low employment rate that these courses – especially in the area of biotechnologies – show in Central Italy, which is equal to 38.9% (results not shown).

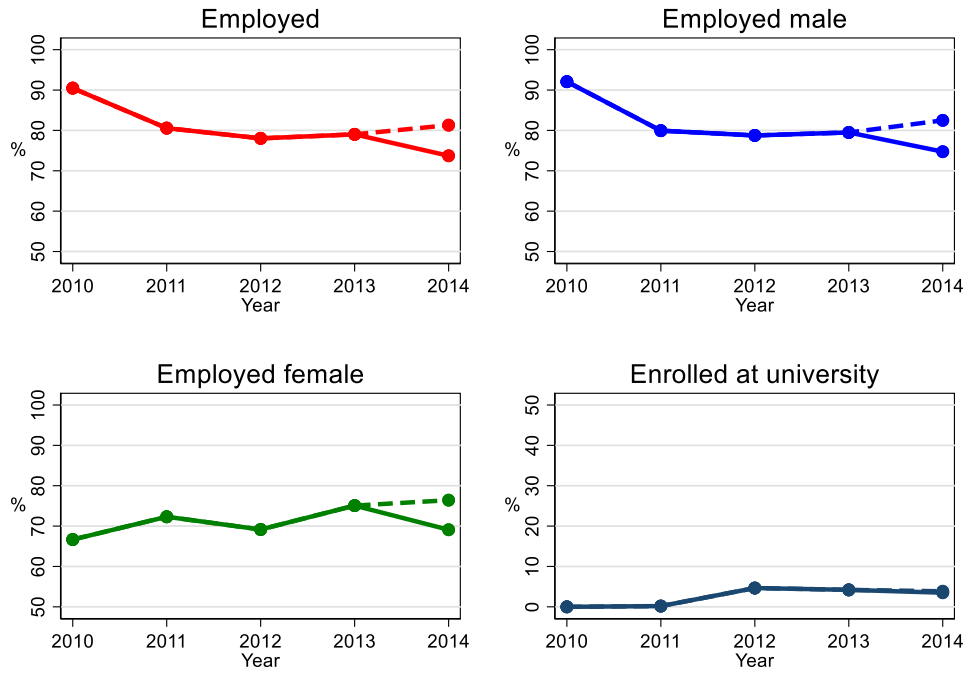
Table 2.5. ITS employment outcomes (quantity) one year after graduation, by geographical distribution and field of study

	% Employed	% Male employed	% Female employed	% Enrolled at university
Geographical distribution				
North-West	80.6	81.7	73.3	2.5
North-East	83.4	84.2	76.0	3.4
Centre	71.5	72.5	64.1	3.3
South and Islands	68.2	66.8	66.7	4.8
Field				
Field 1	72.0	71.4	77.9	4.5
Field 2	80.7	81.1	71.3	1.5
Field 3	68.7	68.3	65.9	1.7
Field 4	79.8	81.6	69.9	3.6
Field 5	74.4	75.4	68.6	2.7
Field 6	73.6	70.3	73.1	5.7
Total	*77.5*	*78.0*	*71.1*	*3.3*

Source: own elaboration on INDIRE (2018) data

The probability of being employed is higher among men (78.0%) compared to women (71.1%). Among men, differences concerning geographical distribution and field of study mirror those observed in the whole students population, whereas among women the percentage of employed people is low even in Central regions (64.1%) as well as in the field of New technologies for Made in Italy products (69.9%) and, on the contrary, very high in the field of Energy efficiency (77.9%), which is the only case where the employment rate of women is higher than the one of men.

Figure 2.6. ITS employment outcomes (quantity) one year after graduation, by course starting year



Source: own elaboration on INDIRE (2018) data
Notes: Dashed curves exclude 11 courses that started in 2014 and have 0 employed, since it is not possible to know if enough time has passed (one year) to collect information on their students' employment outcomes.

Figure 2.6 shows how the employment rate, on average and by gender, evolved over time. The dashed curves exclude those courses for which it is not possible to know whether enough time has passed to collect information about their students' employment outcomes (see above). In general, and among men, the percentage of employed people decreased over the

years, but the decrease is actually to be found between the first two years, when the number of courses and students dramatically increased and the composition of the latter became more heterogeneous. 90.5% of the students (92.1% of men) enrolled in 2010 found a job within one year after graduation, whereas the same proportion was equal to 80.6% (79.9% for men) for those enrolled in 2011. Then the employment rate became stable around 80%, even for those enrolled in 2014, if we exclude the courses where it is not possible to know if employment outcomes have been already observed. Among women, the probability of being employed increased over time: among those enrolled in 2010, 66.6% had a job one year after graduation, whereas among those enrolled four years later the same proportion was 69.1% (76.4% if we consider the dashed curves).

The percentage of ITS graduates enrolling at university slightly increased over time, but remained very low during the whole period. For instance, no students enrolled in 2010 (and basically also in 2011, since the proportion is 0.2%) moved to university, whereas tertiary education attracted 3.9% of the students enrolled four years later.

Looking at employment outcomes in qualitative terms, among those employed one year after the degree, 86.1% had a job consistent with his or her studies (table 2.6). The consistency of jobs with respect to the main subjects of the course is relevant, since it can be seen as an indicator, among other things, of the ability of the ITS foundation to meet the requirement of the companies of its geographical area and, indirectly, of the relationship between the course and the labour market, as well as of the degree of specificity of the skills transmitted by the course. At the same time, however, the percentage of consistent jobs is affected by the number of Italian companies active in a specific sector: if this number is small, there is less space for students graduated in a similar field to find consistent jobs.

Table 2.6. ITS employment outcomes (quality) one year after graduation, by geographical distribution and field of study

	% Consistent jobs	% Permanent	% Temporary	% Apprenticeship
Geographical distribution				
North-West	88.0	31.8	34.4	13.1
North-East	90.7	23.2	38.5	20.3
Centre	85.6	24.4	44.0	13.8
South and Islands	74.7	23.8	53.7	5.3
Field				
Field 1	76.1	28.1	46.3	10.6
Field 2	91.9	37.9	32.1	7.6
Field 3	77.1	13.1	57.2	22.5
Field 4	88.5	24.6	39.5	16.8
Field 5	86.4	22.6	37.9	22.9
Field 6	78.9	19.6	52.4	6.7
Total	*86.1*	*26.5*	*40.7*	*14.0*

Source: own elaboration on INDIRE (2018) data

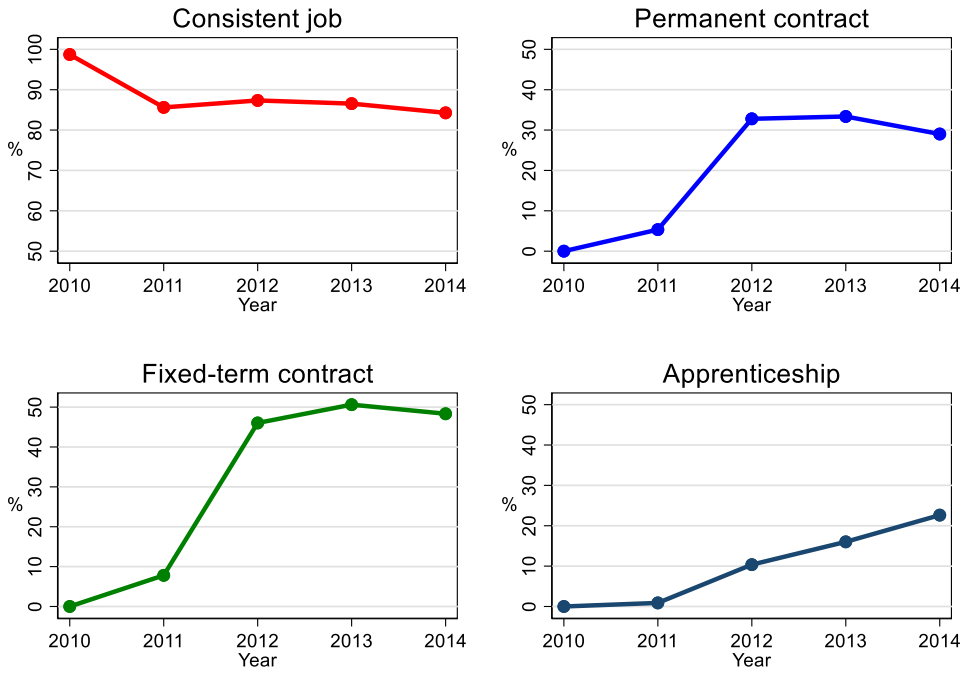
Consistent jobs are more frequent in Central and Northern regions, especially in the North-East, where more than nine graduates out of ten work in an area consistent with their ITS field of study. ITS courses in these regions are probably able to have a stronger link with the territory which, together with a more favourable socio-economic context, not only provides better employment opportunities, but also a better match between education and labour market than it is in the South.

Concerning differences by field of study, percentages are the highest in Sustainable mobility (91.9%) and New technologies for Made in Italy products (88.5%) and lowest in Energy efficiency (76.1%), New technologies for life (77.1%) and Innovative technologies for cultural heritage and tourism (78.9%). It is possible that the high job consistency in the field of Sustainable mobility is partially driven by the fact that these ITS courses transmit highly-specific skills that are difficult to use outside the specific area (e.g. production and

maintenance of means of transport and infrastructures), differently from courses in the field of Innovative technologies for cultural heritage and tourism, which are more likely to transmit general and soft skills that can be relevant in a number of occupations.

Among those who work one year after graduation, 26.5% have a permanent contract, 40.7% a temporary contract and 14.0% an apprenticeship contract. Differently from the proportion of employed people (see above), the proportion of permanent contracts is only slightly higher than that of university graduates in the same period, which is equal to 23.2% (Consorzio Interuniversitario AlmaLaurea 2018). Permanent contracts are more frequent in the North-West (31.8%) and in the fields of Sustainable mobility (37.9%) and Energy efficiency (28.1%), whereas fixed-term contracts are more frequent in Southern regions (53.7%) as well as in the fields of New technologies for life (57.2%) and Innovative technologies for cultural heritage and tourism (52.4%). Finally, students are more likely to be hired in apprenticeship in the North-east (20.3%) and in the field of New technologies for life (22.5%) and Information and communication technologies (22.9%). If we consider permanent contracts and apprenticeships to be the best jobs, employment outcomes in qualitative terms (and differences therein) are similar – with few exceptions – from those in quantitative terms, confirming that those courses giving good probability of being employed also provide good quality jobs.

Figure 2.7. ITS employment outcomes (quality) one year after graduation, by course starting year



Source: own elaboration on INDIRE (2018) data

Finally, trends over time show a constant rate of matching between field of study and type of jobs, despite a reduction between courses activated in 2010 – when 98.7% of the students had a job consistent with their studies – and courses activated one year later – when the same proportion was 85.6% (figure 2.7). Findings concerning the type of contract show an increase in every outcome, especially between courses started in 2011 and 2012. However, information referring to the job contract seem to have some limitations in the data – presumably related to the unavailability or difficulty to collect them by the ITS foundations –, since all of the 6 courses activated in 2010 report zero employed with all the three types of contract and, among the 57 courses activated in 2011, 50 of them report zero employed with a permanent or fixed-term contract and 54 report zero employed with an apprenticeship contract. If we only consider the years from 2012 to 2014, where the data seem more reliable, the percentage of permanent and fixed-term workers remained stable, whereas the

percentage of apprenticeships increased from 10.4% to 22.6%, consistently with the changes in the legislation of this type of contract (d. leg. 81/2015), promoting the use of the apprenticeship of I and III type.

2.6 The relationship between ITS and the labour market

Table 2.7 gives information concerning those ITS instructors coming from the labour market. The first column shows the average number of teachers external to the foundation, which has some limitations since it is affected by an information not available in the data, i.e. the total number of teachers in each course. In order to partially control for this bias, we computed the ratio between the number of external teachers and the enrolled students: if the ratio is equal to 1, there is an equal number of external teachers and students; if it is lower than 1, the number of students is higher than the number of external teachers; if it is higher than 1, the number of external teachers is higher than the number of students.

On average, instructors from the labour market are 34.30 by course and the ratio is 1.43, which means that there are 1.43 external teachers for every student. This ratio is higher in the North (1.48) than in the Centre (1.36) and in the South (1.33) and it is highest for courses in New technologies for life, where there are almost two external teachers for every student (1.83), and lowest for courses in Information and communication technologies, where the number of external teachers is only slightly higher than the number of students (1.20).

Table 2.7. Characteristics of ITS instructors from the market, by geographical distribution and field of study

	External teachers (mean)	Ratio T/E	% Firms	% Training	% Res.	% School	% Univ.	% Other
Geographical distribution								
North-West	34.19	1.48	45.7	4.0	1.6	16.1	10.5	22.1
North-East	36.44	1.48	48.9	3.8	2.6	13.7	12.2	18.8
Centre	32.51	1.36	52.2	1.1	1.0	14.0	14.8	16.9
South and Islands	33.08	1.33	46.6	2.2	2.6	15.3	14.5	18.7
Field								
Field 1	35.02	1.43	39.0	1.8	1.0	14.9	13.1	30.3
Field 2	32.81	1.36	45.2	3.9	0.6	18.2	10.6	21.5
Field 3	43.69	1.83	52.1	0.8	4.7	9.7	15.6	17.1
Field 4	34.43	1.47	48.4	2.2	2.7	15.1	13.4	18.3
Field 5	31.02	1.20	60.1	7.3	0.5	16.5	8.2	7.4
Field 6	33.49	1.34	48.8	4.4	2.0	9.3	13.7	21.8
Total	*34.30*	*1.43*	*48.0*	*3.1*	*2.0*	*14.9*	*12.5*	*19.6*

Source: own elaboration on INDIRE (2018) data

Note: Ratio T/E is the ratio between external teachers and enrolled students; % firms (training, res., school, univ. and other) is the % of teachers from firms (training agencies, research institutes, schools, universities and other institutions).

About half of these instructors are employed in firms or companies (48.0%), especially in the field of Information and communication technologies (60.1%). One out of seven or eight instructors is an upper secondary school teacher (14.9%), especially in the field of Sustainable mobility (18.2%), or an university professor (12.5%), especially in the field of New technologies for life (15.6%). Finally, only 2-3% of these teachers work in training agencies or research institutes, whereas the 19.6% come from institutions not specified in the data.

A second group of variables useful to study the relationship between ITS and labour market refers to the internships activated in each course (table 2.8). The first two columns show the differences by geographical area and field of study in the average number of internships as well as in the ratio between internships and enrolled students, which measures how many stages are activated per student. This ratio helps to control the possible bias related to the

fact that the number of internships may be higher simply because the number of students is higher.

Table 2.8. Characteristics of ITS internships, by geographical distribution and field of study

	Stage	Ratio stage/ enrolled	% hours in stage	Ratio enrolled / firms	% At least two types of institutions
Geographical distribution					
North-West	15.61	0.67	23.0	3.28	44.5
North-East	26.52	1.06	21.0	1.04	58.7
Centre	15.24	0.63	24.1	1.84	54.1
South and Islands	14.39	0.57	22.6	3.12	61.3
Field					
Field 1	19.95	0.77	19.9	1.62	82.0
Field 2	10.54	0.43	25.3	6.28	21.0
Field 3	9.26	0.38	29.8	2.15	37.5
Field 4	19.52	0.83	21.8	1.40	51.3
Field 5	22.75	0.88	21.1	1.22	76.3
Field 6	25.63	1.03	21.9	1.11	77.3
Total	*18.35*	*0.75*	*22.5*	*2.34*	*53.5*

Source: own elaboration on INDIRE (2018) data

On average, each ITS course has activated 18.35 internships, 0.75 for each student, which means that not all the students experience a stage during the course. The few exceptions are the courses in the North-East (ratio=1.06) and in the field of Innovative technologies for cultural heritage and tourism (1.03). This is a negative figure, since one of the main aims of the ITS is to guarantee a substantive period of on-the-job training to all the students. However, the figure might be underestimated, since data do not consider whether ITS courses activate other types of on-the-job training (e.g. *alternanza scuola-lavoro*), nor do they consider the possible hiring of students by firms, both as employees and apprentices.

The third column of the table shows that the percentage of total course hours spent in internship is lower than what established by law. Indeed, ITS courses should guarantee at least 30% of hours in stage, whereas the real percentage is 22.5%. Only courses in the field of New technologies for life manage to follow the guidelines, with 29.8% of hours spent in internships, whereas this percentage is very low for courses in Energy efficiency (19.9%) and Information and communication technologies (21.1%).

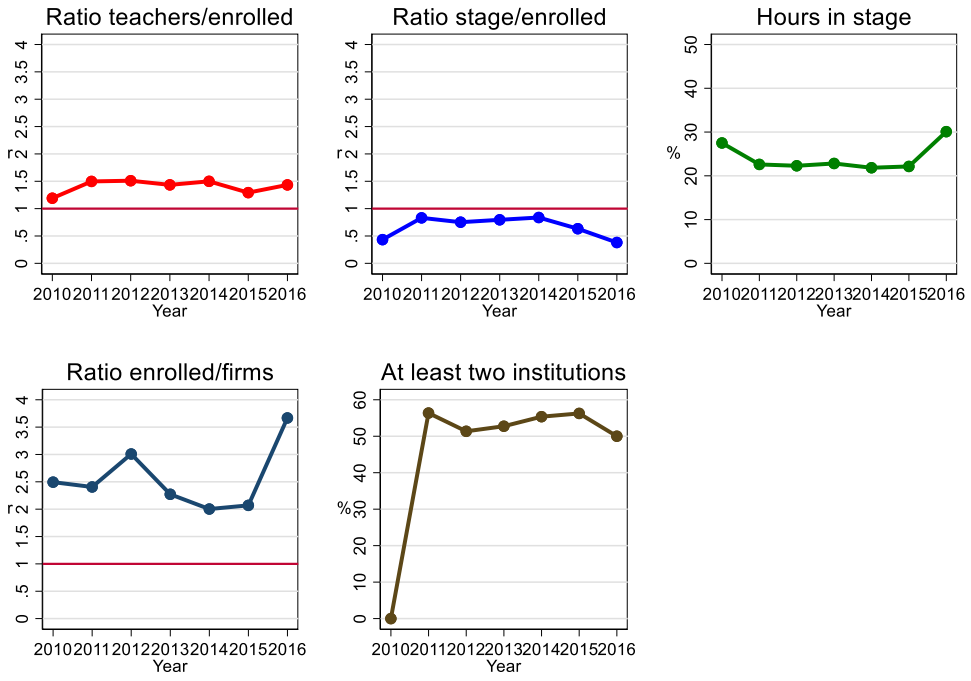
Finally, the table presents two measures concerning the number of host institutions (e.g. firms, research institutes, schools etc.) involved in the internships, which can be taken as indicators of the ability of each ITS course to create networks with the labour market. The first indicator is the ratio between the number of enrolled students and the number of institutions hosting them in stage: the higher the ratio, the lower the number of involved institutions. The ratio is equal to 2.34, hence around two students are hosted in each institution for a period of on-the-job training. The ratio is very high in North-western and Southern regions, where more than three students are hosted in a single internship location, whereas it is very low – and basically equal to 1 – in North-eastern regions, where there is one institution for each student. Concerning differences by field of study, the ratio is much higher in Sustainable mobility, where each institution hosts more than six students, than in the field of Innovative technologies for cultural heritage and tourism, where each student is hosted in one location. This variation is likely to be a function of the average firm size, bigger in manufacturing and smaller in services.

The second measure shows that 53.5% of ITS courses involves at least two different types of institutions for internships (e.g. firms and schools, research agencies and university departments, unions' associations and employers' association etc.). With the only exception

of courses in Southern Italy – where there is a high percentage of courses involving different types of institutions (61.3%) despite a very low number of locations with respect to enrolled students –, this indicator is in line with the ratio between students and locations. Indeed, this second measure is systematically high when the ratio is closer to 1 – such as in North-eastern regions (58.7%) as well as in the fields of Energy efficiency (82.0%), Information and communication technologies (76.3%) and Innovative technologies for cultural heritage and tourism (77.3%).

Figure 2.8 shows how our indicators concerning the relationship between ITS and labour market evolved over time. The number of external teachers increased over time with respect to the number of enrolled students, from 1.19 for courses activated in 2010 to 1.43 for courses activated in 2016. Moreover, the number of internships for each student increased until courses activated in 2014 and then decreased, whereas the percentage of hours devoted to stage decreased until courses activated in 2014 and then increased, reaching the minimum percentage established by law in 2016 (30.1%). In other words, although the number of stages decreased in the last years – but it is important to consider that other types of on-the-job training or even employment contract might be activated –, the amount of time spent working increased.

Figure 2.8. Relationship between ITS and the labour market, by course starting year



Source: own elaboration on INDIRE (2018) data

Finally, the ratio between the number of enrolled students and the number of institutions hosting them in stage decreased – with one fluctuation between 2011 and 2013 – until 2015, when on average about two students did their internship in each institution, and then strongly increased in 2016, when the ratio grew to 3.67. Concerning the different types of institutions, there was a notable increase in the percentage of courses involving more than one type of location between 2010 and 2011, and then the percentage remained stable around 50-55% in the whole period observed. Hence, it seems that there was an improvement in the ability of ITS courses to create networks with the labour market at least until 2016, when the number (and the variety) of institutions involved in internships decreased.

Part 2. Focus on Youth

3. The 'Focus on Youth' Project

This section opens the second part of our research, which primarily aims at studying in depth the three ITS courses designed in the frame of the 'Focus on Youth' Project (hereafter, FoY). The first aim of the chapter is to present the research design used to trace the process of creation and design of these courses and to monitor their operative phase (par. 3.1). On this respect, we combined quantitative and qualitative methods to better investigate the various phases of the courses, from their ideation to their final outcomes.

After presenting the research design, we start with a detailed description of the project FoY. More specifically, we aim at outlining: a) the socio-economic needs characterizing the Italian labour market and the condition of young people that stimulated Assolombarda and JPMorgan Chase Foundation to respectively design and finance the project (par. 3.2); b) the main focus and objectives of the project as well as the actors involved (par. 3.3). Finally, the last aim of this section is to introduce the three ITS courses that are the main object of the project and to describe in detail the process of their conception (par. 3.4) and design (par. 3.5).

3.1 Research design: how to study the phases of the three ITS courses?

In order to investigate the processes of conception and design of the courses, as well as to monitor their operational phase and to study their final outcomes, we conducted one case study for each course, based on the available documentation, both on paper and online, and on semi-structured interviews with key informants, including among the actors involved in the project primarily Assolombarda's Education Systems and Human Capital Unit and the contact persons both in the ITS foundations and in the companies participating to the design and/or the management of the courses[9].

More specifically, in order to outline how the FoY project started, what socio-economic issues were behind it as well as what were its main focus and aims, we proceeded in two steps. First, we referred to the on-paper documentation provided by Assolombarda, especially concerning the proposal of the project submitted to JPMorgan Chase Foundation, as well as to the online documentation, primarily focusing on the websites of the ITS foundations that were supposed to implement the courses. Second, we conducted a semi-structured interview to the Assolombarda team involved in the FoY project, focusing on the ideation and macro-design of both the project and the three ITS courses.

Concerning the study of the processes of conception, micro-design and management of the courses, we combined both qualitative and quantitative methods. First, we conducted a four semi-structured interviews to the contact persons in the ITS foundations (e.g. directors of foundation, project managers of foundation or its partners, course directors etc.), aiming at investigating how the ITS courses were conceived, designed and managed, and the extent to which companies and other social actors were involved in these processes. Second, we conducted five semi-structured interviews to the contact persons in the companies primarily involved in internships and apprenticeships (HR Directors, Internship Tutors etc.), in order to study their relationship with the course and the ITS foundation, to outline their expectations of both the students and the ITS model developed by the project, and to investigate how their choice to employ people still in training integrates with their wider personnel policy (hiring,

[9] Table A1 in the appendix summarises the research design, including methods and details for each phase of the three ITS courses.

recruiting and training). Finally, concerning specifically the operational phase of the courses and the relationship with companies, we analysed data concerning the composition of students as well as the list of internships and apprenticeships activated in each course.

We also combined different methods to investigate the outcomes of the courses. First, we conducted semi-structured interviews to the contact persons in both the ITS foundations – in order to study the general outcomes of students as well as the virtuous and critical issues encountered – and in the companies – in order to study their evaluations of the students hosted during internships as well as the benefits and costs implied by the collaboration with the ITS. Second, we complemented these interviews by analysing quantitative data on students in terms of their composition, educational and occupational outcomes, and on the evaluation of students in internships and apprenticeships provided by host companies.

3.2 The Italian context for young people: the reasons behind the FoY project

The FoY project was designed by Assolombarda's Education Systems and Human Capital Unit in order to deal with a number of key socio-economic issues characterizing the Italian labour market and, more specifically, the condition of Italian young people. First of all, the youth unemployment rate was – and still is – very high in Italy compared to the European average: it was 37.8% in 2016 among Italian young people from 15 to 24 years, whereas it was 18.7% in the Eu-28 in the same year (Eurostat). Moreover, a very large proportion of Italian young people did not participate in employment, education or other types of training: the rate of NEET was equal to 24.3% in 2016 between the ages 15-34, compared to a European average of 14.2% (Eurostat). It is generally agreed among Italian VET scholars and experts that such bad figures are related to the lack of connection between the educational system and the labour market, as discussed above.

Furthermore, when Italian students enroll in university, they are likely to delay the graduation, and this is only partially explained by their investment in work experience during the studies. Indeed, data on university graduates in 2007 collected by Istat in 2011 show that one third had never worked during studies (32.9% among bachelor graduates and 34.1% among master) and that 44.6% of bachelor graduates (20.5% of master graduates) got their final degree at least one year after the normal duration of studies. On this respect, the probability to graduate on time was only slightly higher for those who did not work (6.0 percentage points among bachelors and 1.9 among masters), confirming that the delay does not totally depend on the difficulties in balancing work and studies (results available from the authors).

Moreover, when Italian students enroll in university – but also in upper secondary school –, a high proportion drops out without attaining the correspondent educational title. For instance, although the dropout rates decreased over time, especially at the lower educational levels, they remained substantially high at upper secondary school, where 20-25% of the enrolled did not manage to get the final degree (Checchi 2003; Ballarino et al. 2010), and primarily at university, where the dropout rates remained around 40-50% (Triventi and Trivellato 2008). Dropout episodes were more frequent among pupils from disadvantaged families, representing an important factor of reproduction on inequalities in educational opportunities (Triventi 2014).

Italy was also characterized by a weak connection between education and labour market (Ballarino 2007), especially because of the weak development of post-secondary vocational courses (Ballarino 2013), despite the high demand of skilled technicians on the part of small- and medium-sized companies. Indeed, the Italian tertiary education system can be considered as unitary, dominated by universities – and other institutions like music and art colleges that are organized similarly to universities –, differently from countries such as Germany, The Netherlands or Great Britain, characterised by a binary system, where traditional universities are complemented by post-secondary technical and vocational

schools (*Fachhochschulen* in Germany, *Hogscholen* in The Netherlands and *Polytechnics* in Great Britain) with stronger relationship with the labour market and better occupational returns (Arum et al. 2007; Ballarino 2009).

In this institutional framework, ITS courses are one of the few technical and vocational tertiary programmes in Italy, hence they were weakly developed, especially in terms of students' enrolment. This depends on the scarce public funding with respect to universities, as we have seen, as well as on the instability of the existing courses. Indeed, the yearly provision of an ITS course is not guaranteed by an automatic financing mechanism, as it is in the case of schools and universities, but depends on the capacity of foundations to submit proposals in response to the annual regional calls (see above). Moreover, especially during the early years after the establishment of an ITS, the institutional timings are unfavourable. Indeed, calls for proposals are usually published during the summer, and the financing of the selected courses is approved at the end of September in order to start by the end of October. Such a situation hampers the promotion of ITS courses and, consequently, makes them less interesting to the best students, who by the summer have already taken their decisions concerning university, labour market or experiences abroad (int4).

Finally, not differently from the other channels of higher education (see above), there is a quite high dropout rate even in the ITS courses, especially after the internship. Often, students – especially those from disadvantaged families – prefer to keep on working after the curricular internship, dropping out from the course before achieving the final ITS degree (int1).

3.3 Aims and focus of the project

Starting from the socio-economic issues listed above, the FoY project had three main aims. The first, and more general, was to develop the ITS system. Indeed, investing in the ITS system would contribute to develop the Italian post-secondary vocational training, especially through the involvement of companies in teaching activities, to improve the employability of young people, to narrow the gap between the skills of young graduates and those required by the labour market, to promote the labour market participation during the studies, and to recover drop-outs from universities.

Second, the project aimed at encouraging companies to invest in the ITS system, regarding not only training activities (e.g. teaching, labs, visits, internships etc.), but also recruitment policies and procedures and, especially, contributing to the financement of the courses. Finally, the third aim, which was somehow preparatory to the previous ones, was to create institutional partnerships with career offices of upper secondary schools and universities in order to increase the awareness of the ITS system among young students, their families and teachers, and to increase the number of ITS students, possibly via a better provision of post-secondary orientation.

Then, the FoY project defined an innovative model with the aim to increase the number of ITS courses financially supported by companies and, more in general, to expand investment in ITS courses, promoting a combination of public and private funding or, in the best scenario, the willingness of companies to provide on their own for the total funding of a course. The two main components of this model were: 1. the integration of ITS courses into recruiting policies and practices of companies, in order for the former to give economic benefits to the latter, e.g. in terms of lower recruiting and hiring costs; 2. the establishment of a "best practice" for the second year, stimulating the hiring of students by companies through an apprenticeship (III level) contract. On this respect, the difference between the previous ITS courses and the new ones was that in the former the recruitment of the student would have occurred *at the end* of the course, whereas in these ones it would occur *during* the course, at the start of the second year. In the terms of the different VET models (see table 1 above) this amounts to a substantial shift from the school-based *statist* model to the

collective model, where firms contribute to the financing of the system by hiring apprentices who will also be students (dual system).

The 'trial' of this innovative model was then the main focus of the FoY project, which was made possible by the full funding from JPMorgan Chase Foundation, providing the resources to create three new ITS courses that were supposed to 'test' the model. The three two-years ITS courses – each lasting 2,000 hours and aiming at involving around 20 students – were created, after the approval of proposals by the region, in the fields of mechatronics, chemistry and tourism. Two criteria were followed in choosing the industries of reference for the courses. First, the economic structure of Lombardy, where these industries are strategic to its economic growth prospects. Moreover, companies in all of the three industries have expressed the need for graduates with ever more specific and qualified skills. Second, the strenght of the existing ITS foundations in the industries, both in general and in their relationship with Assolombarda.

The three courses were the ITS *Automazione e sistemi meccatronici autoferrotranviari* in the field of mechatronics, the ITS *Applicazioni industriali della gomma e del PTFE*[10] in the field of chemistry, and, finally, the ITS *Food and beverage management nelle strutture turistico-ricettive* in the field of turism. The first course was activated by the Foundation '*Istituto Tecnico Superiore Lombardo per le Nuove tecnologie Meccaniche e Meccatroniche*', an ITS foundation constituted in 2014 to develop post-secondary training in advanced manufacturing, particulary concerning the application of state-of-the-art mechanics and mechatronics to the classical "Made in Italy" products. The foundation, located in Sesto San Giovanni (Milano) hosted by the *Opere Sociali Don Bosco*, implements several courses not only in Sesto San Giovanni, but also in other cities in Lombardia, such as Bergamo, Brescia and Lecco. Among its founding partners, there are a number of upper secondary schools (e.g. Comprehensive School 'Breda'), training agencies (e.g. Association CNOS-FAP RL), employers' association (e.g. Assolombarda) and companies (e.g. Cosberg), which are complemented by several participant actors, especially companies in the fields of rail and public transport.

The second course was activated by the Foundation '*ITS Nuove Tecnologie per la Vita*', constituted in 2010 in the field of 'New technologies for life' (bio-technologies) and located in Bergamo, by the upper secondary school ISIS 'Giulio Natta'. Together with the school that hosts the headquarter of the foundation, several other actors, among which companies, associations and training agencies, belong to the foundation either as founding (e.g. ITIS Molinari, Prodest, Assolombarda etc.) or participant partners (Assogomma, Datwyler Pharma Packaging Italy etc.).

The third course was activated by the Foundation '*ITS Innovaturismo*', which was settled up in 2014 in the field of 'Innovative technologies for cultural heritage and tourism' and implemented courses in the area of tourism (e.g. hotel manager, thermal tourism etc.). The foundation has a stable networks, which is getting stronger over time (e.g. CAPAC, Galdus, CFP Canossa etc.) and constantly creates new partnerships answering to specific requirements from the labour market (e.g. Eur&ka as for the development of mountain areas) (int4).

The final aims were to establish a strong link between these courses and the companies (e.g. one third of the hours spent within companies, half of the instructors coming from companies) and to guarantee the replicability of the innovative model to all the foundations operating in Lombardia and Italy in the same technological areas.

[10] Better known as Teflon.

3.4 The creation of the three FoY courses

Having been granted the opportunity to benefit from a private funding, thanks to the investment by JPMorgan Chase Foundation, the three foundations decided to conceive three brand new ITS courses, extending the available training on offer, but also drawing on their own successful experiences.

The Foundation *ITS Lombardia Meccatronica* conceived a brand new ITS course focusing on the maintenance of railway trains, underground trains and road public vehicles (*veicoli su gomma*), which complemented a number of courses on industrial mechatronics already well-established in Sesto San Giovanni and Bergamo. The new course was an upgrade of an IFTS course[11] organized for the previous two years by the foundation and located in Sesto San Giovanni, focusing only on the maintenance of trains and born in response to demand coming from companies operating in this sector in Lombardy, hence giving very good employment outcomes to students. Through this process of upgrading, the foundation widened the spectrum of skills to be transmitted, since the duration of the ITS course was longer than the duration of the IFTS (two years the former, one year the latter), and the new course, moreover, did not only focus on trains but also on road public vehicles (int2).

The Foundation *ITS Nuove tecnologie per la vita* activated a new course located in Milan that was very similar to another ITS course organized during the previous three years in Bergamo and addressed to – and, in its first edition, totally financed by – those companies active in the production of gaskets in the Sebino area, which were members of the *Associazione Produttori Guarnizioni del Sebino*. The main difference between the two courses was the main applications of rubber considered, since the new course focused on the production of tubes and tyres, whereas the 'old' one on the production of gaskets (int3).

Finally, the Foundation *ITS Innovaturismo* decided to create a new course in the field of food and beverage management, aiming at training a technician in charge of the operational and managerial processes of food and beverage services (primarily) in hotels. This course was built on two previous experiences organized by the foundation, partially related to the area of food and beverage. The first was the ITS course *Hotel Manager - Tecnico superiore per la gestione delle strutture turistico ricettive*, which was organized during the Milan EXPO (2015) and primarily focused on 'bleisure' tourism, with an important component related to the food and beverage. Indeed, this course, which is the main ITS activated by the foundation, implied the transmission of a number of skills concerning the food and beverage, although this was not its main focus. The second was the IFTS course *Tecniche delle preparazioni enogastronomiche per la valorizzazione del territorio*, organized in the province of Brescia by two partners of the foundation (CFP Zanardelli and CFP Canossa) and focusing on the processing and preparation of the oenogastronomic products. Differently from the food and beverage manager, who has a managerial role, the technician trained in this course has an executive role and directly works in the field of restaurant and oenogastronomic production (e.g. dairies, breweries, wineries etc.), where food and beverages are prepared or marketed, enhancing the typical production of the territory (int4).

The relationship with the labour market and the specific requirements of companies were crucial in the conception of all the three ITS courses. Indeed, the decision to devote part of the new course in mechatronics to the maintenance of public road vehicles depended from the requirements of some local companies, which needed to employ qualified workers both in public transport as well as in 'special' vehicles related to garbage, sanitation, and so on (int2).

Concerning the course in chemistry, it was born starting from the requirements of some companies (Pirelli, Datwyler, Zeon Europe, Marangoni and Estomer) active in the production of tubes and tyres, who expressed the need of a new and specific profile and also joined the Foundation *ITS Nuove tecnologie per la vita* to collaborate in the conception and design of

[11] IFTS courses are 1-year vocational post-secondary courses, introduced in the late 90s.

the course. As written above, although the course was very similar to the one already existing in Bergamo, teaching and training activities were adapted to the specific requirements of these firms (int3).

Finally, the ITS course in the field of tourism was born starting from the main activity of two partners of the Foundation *ITS Innovaturismo*, namely CAPAC Politecnico del Commercio e del Turismo (a foundation providing training and career services in the tertiary sector) and Galdus (a training centre for young and old people and firms), which identified some areas of medium- and high-level skills needs in the touristic and hospitality areas, especially in the food and beverage management (int4).

3.5 The design of the FoY courses

Once the courses have been conceived, the initial ideas and aims have to be translated into a teaching programme: this is the process of design, when skills, subjects and corresponding methodologies are defined (Ballarino and Regini 2003). Our case studies show that the design of the three FoY courses was managed by the ITS foundations with a relevant involvement of actors from the labour market.
The ITS in the field of chemistry was designed starting from the experience of a similar course previously held in Bergamo (see above), adapting it to the specific requirements of those Milan companies who joined the Foundation *ITS Nuove tecnologie per la vita* during the process of conception of the course. In this case, the role of companies in the design of the course was crucial not only in its initial steps, but also after the course started. Indeed, companies were involved at the beginning to identify the skills to be transmitted and to prepare the syllabus, and they were also constantly listened in order to monitor the teaching and training activities and to adjust both *in itinere*. The main reference point for the foundation in this process was actually Assogomma, the employer association of the rubber industry, which acted as a filter between the course and the involved companies. It is also interesting to note that the companies were involved as early as in the selection of the course's students: their HR representatives interviewed themselves the applicants, thus creating a strong link between the course and the labour market (int3).

The course was not only linked to the labour market, but also to university. Indeed, it was designed to give the possibility to its graduates to move to university after the final exam, enrolling at the third year of the bachelor degree in industrial engineering, with the recognition of 120 credits, that is of two full years of course (int3).

The design of the ITS in the field of mechatronics – as well as the involvement of external actors in the process – was instead partially constrained by some rules related to the security in the railway area. Indeed, the course provided, in addition to basic and soft skills, vocational skills divided in two parts. The first part concerned the trains and dialogued with a niche sector that in Italy is strictly regulated because of security concerns, widened since the Viareggio train catastrophe in 2009[12]. Therefore, nowadays only operators licensed (*abilitati*) by the national agency for the railway security (ANSF) can do the maintenance of trains, which was one of the main aims and employment outcomes of this course. This regulation hence affected the design of the 'train part' of the course, which had to follow the training plans strictly defined by the ANSF, required in order to get the licence (*abilitazione*) to work in trains maintenance. Moreover, the course was characterized by exams (held by licensed instructors) at the end of each teaching module to certificate skills corresponding to the train components critical from a security point of view (*organi di sicurezza*). Despite such constraints on the process of design and on the freedom to involve other actors, the resulting structure of the course was quite effective, since students managed to get between

[12] On June 29, 2009, a freight train consisting of fourteen tank wagons containing LPG, derailed (probably) because of the failure of the trolley of the first tank wagon, producing a chaotic fire in the Viareggio railway station and in the nearby neighborhoods, causing 32 dead and 17 injured.

three and six certifications during the course, thus gaining crucial credentials for their labour market transition (int2).

The design of the second part of the course, concerning the automotive industry, had more leeway. Thus, the ITS design team could involve several external actors (e.g. instructors operating in the vocational centre for the training of the train maintenance workers, companies in the railway industry, technicians and consultants etc.) to define a new professional figure. According to the design, there were several skills to be transmitted, some similar to those transmitted in the 'train part', especially if related to vehicles with electric traction, since elements like the braking or doors installations do not dramatically differ, and others specific to the automotive (int2).

Finally, the actors involved in the design of the ITS *Food and beverage manager*, who had a primary role in its management as well, drew on the pro-active work of the Technical-Scientific Committee (CTS) within the foundation, which identified the need to focus on the area of food and beverage management, as well as on the relationship with companies belonging to the CTS, which gave a number of suggestions on required skills etc.

The course provided two types of skills: the basic skills identified by the national curricula (determined by the ministry), required in order to get the final ITS degree, and the specific skills related to the profession, as defined by the regional framework of professional standards (*quadro regionale degli standard professionali*). Hence, skills, subjects and relative methodologies were defined through a mix of formal inputs (ITS Decree, regional calls, guidelines, *quadro regionale* etc.) – that were important because they certified the possession of standardized skills that will be useful for students for other courses and, especially, in the labour market – and innovation coming from the dialogue with companies (int4).

The design of the course and the relationship with external actors was also characterized by a constant project management and course evaluation *in itinere*, also because of a partially problematic – and actually precious, since it favoured the ideation of new solutions that can be useful for further courses (see below) – development of the course. Indeed, the course had some difficulties to attract brilliant and highly motivated students at the beginning, primarily because of the delay in the call for proposals and the consequent impossibility to adequately promote the course. Moreover, the course had a high dropout rate (see below) and several students had specific requirements in terms of balancing teaching and on-the-job training because they were already working before the beginning of the course or they found a job after the course started (int4).

Therefore, applying a specific norm of the ITS decree, according to which skills can also be primarily acquired on the job instead of in school classes, the ITS project designers took a great effort in producing a kind of personalized micro-design for each student, negotiating deals with the companies where students were already working or went to do the on-the-job training (e.g. combination of various work experiences, internship, on-the-job training etc.) and creating documentary portfolios certifying the personalized ways in which students attained the compulsory skills, evaluated by school teachers, internship tutors, and so on (int4).

Appendix

Table A1. Research design to study the three FoY courses

Issue	*Method*	*Details*	*Course*
Ideation and macro-design of project and courses	On-paper and online documentation	Project Proposal, ITS foundations websites	All
	Semi-structured interviews	Assolombarda Team (int1)	All
Creation, micro-design and management of courses	Semi-structured interviews	Director, Foundation ITS Lombardia Meccatronica (int2)	Mechatronics
		President, Foundation ITS Nuove tecnologie per la vita (int3)	Chemistry
		Project Designer and Manager, Foundation ITS Innovaturismo and CAPAC (int4)	Tourism
		Course Director, Fondation ITS Lombardia Meccatronica and CNOS-FAP (int5)	Mechatronics
		Central R&D Director, Marangoni SpA (int6a)	Chemistry
		HR Director, Marangoni SpA (int6b)	Chemistry
		Engineer and Internship Tutor, Marangoni SpA (int6c)	Chemistry
		Managing Director, Datwyler Pharma Packaging Italy srl (int7a)	Chemistry
		Head of HR, Datwyler Pharma Packaging Italy srl (int7b)	Chemistry
		HR Assistant, Datwyler Pharma Packaging Italy srl (int7c)	Chemistry
		General Manager, Hotel Raffaello Milano (int8)	Tourism
		Receptionist and Internship Tutor, Ibis Style Milano Melegnano (int9)	Tourism
		HR Assistant, Saiem Srl (int10)	Mechatronics
	Data analysis	ITS students, List of internships and apprenticeships	All
Outcomes of courses	Semi-structured interviews	HR Assistant, Saiem Srl (int11)	Mechatronics
		Receptionist and Internship Tutor, Ibis Style Milano Melegnano (int12)	Tourism
		General Manager, Hotel Raffaello Milano (int13)	Tourism
		Central R&D Director, Marangoni SpA (int14)	Chemistry
		Managing Director, Datwyler Pharma Packaging Italy srl (int15a)	Chemistry

	Head of HR, Datwyler Pharma Packaging Italy srl (int15b)	Chemistry
	Project Designer and Manager, Foundation ITS Innovaturismo and CAPAC (int16a)	Tourism
	Project Handler, Galdus Academy (int16b)	Tourism
	Students' Tutor, Galdus Academy (int16c)	Tourism
	Course Director, Foundation ITS Lombardia Meccatronica and CNOS-FAP (int17a)	Mechatronics
	New course Director, Foundation ITS Lombardia Meccatronica and CNOS-FAP (int17b)	Mechatronics
	President, Foundation ITS Nuove tecnologie per la vita (int18a)	Chemistry
	Placement Tutor, Foundation ITS Nuove tecnologie per la vita (int18b)	Chemistry
Data analysis	ITS students, Companies' evaluation of internships and apprenticeships	All

4. Management of the FoY courses

The third phase of the process of establishment of an educational course (of whatever type) is the operational phase, which follows the conception and the design. It includes the administrative management and the teaching activities, characterised by traditional teaching (frontal lectures), other teaching methodologies (e.g. labs, business experiences, visits in companies etc.) as well as internships and other forms of on-the-job training (Ballarino and Regini 2013).

This section aims at studying the operational phase of the three FoY courses, especially focusing on the teaching activities as well as on the on-the-job training. Moreover, since students become crucial in the operational phase of a course, we also describe their composition, in terms of gender and socio-economic background, and we also tally the episodes of drop-outs during the course. Finally, since one of the main peculiarities of the FoY project was to introduce the apprenticeship (III level) contract during the second year of the ITS course, we outline the main strengths and weaknesses found by ITS foundations and companies in the use of such contract.

More specifically, by combining quantitative and qualitative methods and focusing on the relationship with the labour market, we describe the structure of the courses and of their teaching activities (par. 4.1), the composition of the students as well as of the drop-outs, and discuss the methods outlined by the ITS foundations in order to address this critical issue (par. 4.2). Finally, we present evidence concerning internships and other forms of on-the-job training (par. 4.3) as well as the apprenticeships and the other employment contracts activated during the three FoY courses of interest (par. 4.4).

4.1 Structure and teaching activities of the FoY courses

The three FoY courses had the same duration of two years, namely 2,000 total hours. However, the organization of the two years and the combination of various teaching activities strongly differed across courses. For instance, the ITS in the field of mechatronics was divided in 1,150 hours of frontal lectures in class; labs and lectures in companies (750 in the first year and 400 in the second); 250 hours of internship at the end of the first year and 600 hours of apprenticeship in the second year. The internship was considered to be a ‘test’ to the students before the apprenticeship: since they were supposed to be hired with an apprenticeship contract, the companies were given the opportunity to test and evaluate the students (and vice-versa) during the internship (int2). Concerning the second year, the 400 hours of training at school were structured in modules (160 hours in November-December, 160 hours in March-April and, finally, 80 hours in June-July useful to prepare the final exam) in order to ensure the continuous presence at job of the students, either for work or for training within companies (int2, int5).

Unlike the ITS in mechatronics, which combined training in school and on the job during both years, the course in the field of chemistry placed the job-related activities at the end of the teaching activities at school. Indeed, the course was structured in 1,200 hours of theoretical and practical activities (e.g. frontal lectures, labs etc.), followed by 800 hours of internships, aiming at guaranteeing a future recruitment in the host company. The very first part of the

course was also devoted to modules of skills realignment, especially meant for those students lacking a technical background.

Finally, the course in the field of tourism included 600 hours of frontal lectures and labs, promoting a very active, engaging and stimulating way of teaching; 500 hours of on-the-job training in the best hotels in Milan and 900 hours of internship, promoting the hiring of students via apprenticeship contracts. The designed structure was actually changed *in itinere* because of a number of problems experienced by the course (e.g. dropouts, difficulties to activate apprenticeships, unavailability of companies, as will be detailed below), creating personalized paths for most students. Indeed, "design became management" in this course, and there was a constant adjustment to catch available opportunities and overcome any obstacle, also adapting the teaching to the development of the labour market (int4).

The participation of external actors to the teaching was substantial in all of the three courses, especially in the *ITS Applicazioni industriali della gomma e del PTFE* and in the *ITS Food and beverage management nelle strutture turistico-ricettive*. In the former, the training was primarily done in the labs, and visits in companies were very frequent. More in general, the relationship with companies belonging to Assogomma were constant over the entire course and these exchanges were very constructive, since they provided information on the course's weaknesses and allowed to discuss possible strategies to improve them. More than 60% of instructors of the course came from the companies (e.g. Datwyler, Continental, Zeon Europe, Laboratorio Cerisie etc.) and their support to teaching was especially intense at the end of the first year, strongly linked to the subsequent internships (int3).

In the latter, instructors included people working in the hotel and tourism industry (e.g. Accor group, GDF group), with a long and brilliant experience and a very good ability in managing students. The involvement of people from companies in teaching helped to create a bond between the companies and the course and its students, which were seminal in order to commit companies to the micro-design during the second course year (see above), as well as for future recruitments, since most of the companies involved in teaching were potential employers for the students, when graduate (int4).

Concerning the *ITS Automazione e sistemi meccatronici autoferrotranviari*, during the first year training was primarily devoted to the 'train part', whereas in the second year it was primarily devoted to the 'automotive part' and it was implemented not only at school, but also in the learning centres located in Sesto San Giovanni and Arese. As mentioned earlier, the instructors for the 'train part' have to be be operators licensed by the ANSF (see above). Therefore, already for the previous IFTS on train maintenance, the ITS foundation activated a collaboration with a certified training agency in Naples, which sent its operators to teach the most specific subjects concerning the railway sector (int2, int5).

4.2 The composition of the students and its changes over the two years

At its start, the FoY project involved 65 students: 22 enrolled in the ITS in mechatronics, 20 in the ITS in chemistry and 23 in the ITS in tourism (tab. 4.1). The majority of students were male, although there were notable differences across courses, confirming the uneven gender distribution in fields of study, with female more likely to enrol in ITS courses related to social and communicative skills. Indeed, all of the students enrolled in the field of mechatronics were male, whereas one out of four students was female in the field of chemistry (25.0%) and more than four students out of ten were female in the field of tourism (43.5%).

One of the aims of the FoY project was to involve a relevant proportion of students coming from a disadvantaged background, measured in terms of socio-economic and migratory status. Around 5% of the students came from families with low income, especially in the ITS in mechatronics (9.1%), and almost 20% was born abroad or had migrant parents, especially

in the ITS in tourism (21.7%)[13]. If we combine these two characteristics, one can note that more than 20% of the students enrolled at the start of the course came from a disadvantaged background (21.5%), with no differences according to the field of study[14].

Table 4.1. Composition of enrolled students at the beginning of the course, by FoY course

	Students (N)	Female (%)	Low economic background (%)	Migrants (%)	Disadvantaged background (%)
Mechatronics	22	0.0	9.1	18.2	22.7
Chemistry	20	25.0	5.3	15.0	20.0
Tourism	23	43.5	0.0	21.7	21.7
Total	*65*	*23.1*	*4.7*	*18.5*	*21.5*

Source: own elaboration on ITS students data

The composition of the FoY students slightly changed over the two years because of some drop-outs and drop-ins. Table 4.2 shows the percentage of students that dropped out from the courses during the first (upper panel) or the second year (lower panel), by gender and socio-migratory background, whereas table 4.3 presents some characteristics of the drop-in students. Among students enrolled at the start of the courses, 41.5% dropped out from studies during the first year (tab. 2). This proportion was very high in the ITS in tourism (78.3%), primarily because several students were already working market before enrolling in the course, or found a job during the course. More specifically, the high dropout rate of this course was driven by the difficulties in balancing work and study, either because of the effort required by the course or because of the unavailability of some companies to collaborate with the school in order to channel the work experience within the ITS experience (int1, int4, int16a).

The difficulties in the work-study balance also partially explained why 25% of the students enrolled in the ITS in chemistry did not finish the first year. Indeed, on the one side, some students found a job after the beginning of the course, whereas, on the other side, others students found the course too demanding and not corresponding to their expectations (int3).

Moreover, the table shows that differences by gender in the dropout rate at first year depend on the course. For instance, female students were more likely to drop out if enrolled in the ITS in chemistry compared to the ITS in tourism, where 84.6% of male students enrolled at the beginning decided not to finish the first year. This might be explained by a selection bias: since most enrolled students dropped out because they were already working and, on average, men are more likely to be employed than women, then the dropout rate became higher among male students. Concerning differences by socio-migratory background, those from a disadvantaged background did not drop out from studies during the first year in the ITS in mechatronics and chemistry, whereas the dropout rate did not differ among students enrolled in the ITS in tourism. This might be taken as evidence of the capacity of the ITS courses to promote participation and success in post-secondary education even for students coming from not advantaged contexts.

Finally, the dropout rate in the second year was much lower than the one during the first year. Among the 'survivors' of the first year, only 18.4% decided not to finish the course. This proportion is still higher in the ITS in the field of tourism, where men and students from a disadvantaged background were less likely to drop out. On the contrary, this proportion is lower in the ITS in the field of mechatronics, although interviews showed that there were some issues with the students during the second year, because of their adult age, their necessity to work and their scant knowledge of the ITS framework. However, such difficulties were discussed by ITS tutors, who supported students and dialogued with them, and thus

[13] Migrant students came from the following countries of origin: Ecuador, Philippine, Perù, Chile, Egypt, Morocco, Moldova, Sri Lanka and Tunisia.

[14] The aim of the project was to involve at least 30% of students from disadvantaged backgrounds. However, one of these criteria was very restrictive (i.e. family yearly income lower than 15,000 euros) and, more in general, there could be other dimensions of disadvantage that were not totally captured by socio-economic and migratory status (see chapter 5).

were almost totally solved in the following edition of the same course, thanks also to a creation of a new *forma mentis* in the public opinion, by which ITS are increasingly seen as an actual alternative to the university (int5).

Table 4.2. Dropout rates at first and second year, by gender, socio-migratory background and FoY course. Row percentages

	Mechatronics	Chemistry	Tourism	*Total*
Dropout at 1st year				
Male	18.2	20.0	84.6	*36.0*
Female	.	40.0	70.0	*60.0*
Not disadvantaged	23.5	31.3	77.8	*45.1*
Disadvantaged	0.0	0.0	80.0	*28.6*
Total	*18.2*	*25.0*	*78.3*	*41.5*
Dropout at 2nd year				
Male	11.1	16.7	50.0	*15.6*
Female	.	0.0	66.7	*33.3*
Not disadvantaged	7.7	9.1	75.0	*17.9*
Disadvantaged	20.0	25.0	0.0	*20.0*
Total	*11.1*	*13.3*	*60.0*	*18.4*

Source: own elaboration on ITS students data

Concerning the drop-ins, the ITS foundations recruited 17 new students after the beginning of the course, including 35.3% of females – all in the ITS in tourism, confirming the gender bias of fields of study – and 11.8% of people from a disadvantaged background (tab. 4.3). The decision to include a new student in the ITS in the field of chemistry is partially explained by the difficulties in recruiting young people because of the low attractivity of the rubber industry (despite the high demand of the companies), as well as of the delayed promotion of the course (int3).

Table 4.3. Composition and dropout rates of new entrants, by FoY course

	Students (N)	Female (%)	Disadvantaged background (%)	Dropout at 1st year (%)	Dropout at 2nd year (%)
Mechatronics	3	0.0	33.3	0.0	0.0
Chemistry	1	0.0	0.0	0.0	0.0
Tourism	13	46.2	7.7	53.9	0.0
Total	*17*	*35.3*	*11.8*	*41.2*	*0.0*

Source: own elaboration on ITS students data

The drop-in rate was especially high in the ITS in tourism, where a lot of effort was put in order to fill the vacancies of those students who dropped out during the course, recruiting 13 new students over the two years. Among the new recruits, 53.9% decided not to finish the first year, again showing the difficulties in balancing work and study. Then, in order to increase the number of students, the ITS foundation decided to create *ex novo* a second pathway into the course, including since the second course year five new students with an upper secondary school diploma who had graduated from the IFTS course in *Tecniche di preparazione enogastronomica per la valorizzazione del territorio* (see above)[15]. This strategy, which helped to fill the vacancies in the course and to recruit more motivated students, was an example of the continuous process of micro-design in this course, since the ITS designers had to define modules of skill realignment for the new entrants and to elaborate different ways to design and manage the period of on-the-job training according to the specific situation of the student (int4).

[15] The *ITS Innovaturismo* also evaluated the inclusion of a sixth student that attained the upper secondary diploma abroad. However, it was not possible to include him because his diploma could not be legally compared to the upper secondary diploma in Italy.

4.3 The on-the-job training: internships and other forms

As mentioned, a substantial part of an ITS course had to be spent in internship in order to promote the relationship between school and labour market, thus favouring the job placement of graduates. This paragraph hence aims at describing the internships activated during the FoY courses. Given the peculiarities of the ITS in the field of tourism and its strong link between various forms of on-the-job training and the formal difficulties to activate apprenticeships, we focus only on the courses in the fields of mechatronics and chemistry, postponing the discussion of the ITS in tourism to the next section[16]. Table 4.4 shows the number of internships activated by each course, together with the number of companies involved. Moreover, similarly to the analysis of the INDIRE data (see above), it also presents the ratio between the number of internships and the number of enrolled students – in order to study how many experiences of on-the-job training were activated for each student – as well as between the number of internships and the number of companies[17].

Table 4.4. Characteristics of internships and other forms of on-the-job training activated during the ITS course, by FoY course

	Training on job (N)	Ratio stage/enrolled	Firms (N)	Ratio stage/firms
Mechatronics	20	0.95	5	4.00
Chemistry	13	0.93	10	1.30
Tourism	14	1.27	7	2.00
Total	*47*	*1.05*	*22*	*2.43*

Source: own elaboration on ITS internships and apprenticeships data

The ITS *Automazione e sistemi meccatronici autoferrotranviari* activated 20 internships during the first year, 0.95 for each student. In other words, 95% of the students enrolled in the first course year experienced a period of on-the-job training[18]. Five companies were involved in these activities, four belonging to the railway sector (SITAV, SAIEM, ERMEWA and FRAG) and one to the automotive sector (Milano Industrial). On average, four students were hosted by each firm, but there were some differences. For instance, only one student did his internship experience in Milano Industrial: this figure, as the low number of companies in the automotive sector involved in internships, is in line with the structure of the course, where most part of the first course year was devoted only to skills concerning the 'train part'. Fifteen students were selected to spend their internship in SITAV (n=9) and SAIEM (n=6), two companies with a common ownership working in the repair and maintenance of rolling stock, who have been collaborating with the Foundation *ITS Lombardia Meccatronica* since 2015. The two companies were available to host, after a recruitment process, 6-8 students each, and aim at giving them a comprehensive training in mechatronics and in the maintenance of rolling stock (int10).

The *ITS Applicazioni industriali della gomma e del PTFE* activated 13 internships during the second year and let 13 students out of 14 spend a period of on-the-job training (ratio=0.93)[19]. The ITS foundation involved ten companies and research institutes, including those who participated to previous phases of the course (e.g. Datwyler, Zeon Europe, Laboratorio Cerisie etc.), each hosting one student with the exception of Algam I.A.I. and Datwyler, which hosted two and three students respectively. More specifically, our semi-structured interviews showed that Datwyler, which is a reference point in the rubbery sector, selected three students to be allocated in three different areas (lean manufacturing, pure engineering and

[16] Although the discussion concerning internships in the *ITS Food and beverage management* is postponed to the next paragraph, here we present quantitative results regarding all the three FoY courses.
[17] The ratio between the number of internships and the number of students as for the courses in mechatronics and chemistry can also be interpreted as a proportion, since no student spent more than one period in internship.
[18] This means that only one student enrolled at first year did not spent a period in internship. This person did not attend the second year, hence it is possible that he dropped out the course at the end of the first year, before the period of on-the-job training.
[19] Similarly to the ITS in the field of mechatronics, it is not possible to know if this student dropped out before the period of internship.

production engineering), with the final aim to confirm them with an employment contract, taking account of the budget constraints of the Head Office (int7abc).

4.4 The apprenticeship: strengths and weaknesses

The attendance of the second year of ITS course with an apprenticeship (III level) contract was one of the main innovations of the FoY project. However, ITS foundations found some obstacles in activating these contracts, especially related to resistances on the part of the companies. Table 4.5 shows that only the ITS in the field of mechatronics activated a relevant proportion of apprenticeship (III level) contracts at second year: 11 out of 19 students were hired by companies with this contract (57.9%). Despite this good result, our key informants in the Foundation *ITS Lombardia Meccatronica* confirmed the difficulties to activate apprenticeship, especially with some large maintenance firms and in the large municipal transport companies (e.g. ATM in Milan, ATB in Bergamo etc.) (int2, int5). Indeed, although their technicians were welcoming the hiring of ITS students, as they would represent an important skills upgrade with respect to other candidates, who were usually much less qualified, municipal companies are constrained by law to fill job vacancies only by formalized calls. Moreover, interviewees outlined a scarce knowledge of the apprenticeship (III level) contract among companies: they spent much effort to assist and support companies on this respect, with the aim to create a pool of 'loyal' companies to contribute to future courses. Delays in the apprenticeship, however, sometimes also depended on students' unavailability or on some other requirement on their part.

Table 4.5. Characteristics of ITS apprenticeships and employment contracts activated during the ITS course, by FoY course

	Contracts (N)	Ratio contract/enrolled	Firms (N)	Ratio contract/firms
	Apprenticeships			
Mechatronics	11	0.58	4	2.75
Chemistry	0	0.00	0	0.00
Tourism	1	0.09	1	1.00
Total	*12*	*0.22*	*5*	*1.88*
	Employment contracts (apprenticeships and others)			
Mechatronics	16	0.84	6	2.67
Chemistry	0	0.00	0	0.00
Tourism	8	0.73	7	1.14
Total	*24*	*0.52*	*13*	*1.90*

Source: own elaboration on ITS internships and apprenticeships data

Four companies hired students of this course with an apprenticeship contract (SITAV, SAIEM, ERMEWA and Officina Pizzagalli), both after the internship or not. For instance, SAIEM and SITAV, which were primarily involved also in this phase of the course, hired not only those students who were interns there, but also new students (int10). Although some students in the ITS in mechatronics were not recruited in apprenticeship, they were hired by companies with other employment contracts, such as fixed-term or permanent contracts. Table 5 shows that 16 out of 19 students enrolled at second course year were working, either with an apprenticeship or with other contracts. This means that this ITS provided the recruitment of 84.2% of its students already before graduation.

Concerning the ITS in chemistry, the Foundation *ITS Nuove tecnologie per la vita* did not activate any apprenticeship or other employment contracts (tab. 4.5), primarily because of scarce availability on the part of companies. However, the foundation designed specific internship projects finalized to the occupational placement of the student. Indeed, the strong link with companies did aim not only at providing a period of on-the-job training during the internship, but also at ensuring that the student was immediately productive and ready to the companies' requirements, increasing the opportunities to be hired before or after the end of the course (int3). This is confirmed by interviewees from Datwyler, who claimed that young

people still in ITS training are an investment for the company in the medium and long term, since they would become the first choice for the company in case of vacancies (int7a).

Finally, the low number of apprenticeships concerning the ITS in the field of tourism was explained by the formal difficulties to activate this type of contract in the hotel industry. Indeed, the food and beverage manager, as defined by the ministry, has skills that the industry-specific labour contract recognizes to managers. Moreover, hotels would not hire young students who had not experienced the various steps of on-the-job training, starting from the less qualified tasks. Such issues, related to the traditional human resources management of hotels, made it very difficult the use of apprenticeships, although some companies declared to be willing to hire the students (int16a).

Therefore, most students substituted the apprenticeship with other forms of on-the-job training (e.g. internships, *alternanza scuola-lavoro* etc.). Indeed, the course activated 14 periods of on-the-job training during the two years, 1.27 for each student, as some students spent more than one period in companies (see table 4.4). Seven companies participated in this phase of the course, among which hotels (e.g. Hotel Raffaello Milano, Hotel Ibis Milano Centro etc.), restaurants (e.g. Epizza etc.) and leaders in the food and beverage services (e.g. Vera Ristorazione S.r.l.). On average, two experiences were activated in each company.

Besides internships and other forms of on-the-job training, the *ITS Food and beverage manager nelle strutture turistico-ricettive* was also characterised by a relevant proportion of employment contracts (on average, 0.73 for each student, see table 4.5), which counterbalanced the difficulties with the apprenticeship. Although some of these contracts did already exist before the enrolment in the course, this finding confirms the ability of the Foundation *ITS Innovaturismo* to create, among several difficulties, deals with companies helping young people to conciliate work with study.

5. Outcomes of the FoY courses

How many students involved in the FoY project did get the ITS degree? How did the companies hosting them in internship or apprenticeship evaluate their skills? Which is the employment condition of the ITS graduates some months after the end of the course? Did the companies benefit from the collaboration with the ITS foundations? What are the final evaluations of the courses and the future objectives?

This section aims at answering these questions, studying in depth the outcomes of the three FoY courses. First, we focus on the students, analysing their educational attainment and performance in the final exam (par. 5.1), their employment condition – both in quantitative and qualitative terms – (par. 5.2) as well as the evaluation of their skills on the part of the companies (par. 5.3). Second, we focus on the companies, outlying the main benefits of collaboration with the ITS foundations (par. 5.4). Finally, we describe the main strengths and weaknesses of the three courses, as pointed out by the ITS foundations and companies, and we outline the future objectives for the ITS courses (par. 5.5).

5.1 The educational attainment and performance of the students

38 FoY students attained the ITS degree: 16 in the ITS in mechatronics, 14 in the ITS in chemistry and 8 in the ITS in tourism (tab. 5.1). Thus, the 'general' success rate – computed considering all the students enrolled at the beginning of the course – was quite high in the field of mechatronics (72.7%) and chemistry (70.0%), whereas it was comparatively low in the field of tourism (38.4%). This relates to what was seen in the previous chapter: the dropout rates during the first and second course year were very high in the ITS in tourism (78.3% and 60.0%, respectively), even among the new entrants (53.9%) (see above). However, this measure has some limitations, as there were both drop-outs and drop-ins in all of the three courses. More specifically, it does not consider that some students enrolled in the course *in itinere* and that some of them decided to drop out. Hence, the third column of the table presents the percentage of graduates based only on students enrolled in the second year. This measure shows that the success rate was much higher (92.7%), especially in the ITS in chemistry and tourism, where all the students enrolled in second year got the final degree.

Table 5.1. Characteristics of ITS graduates, by FoY course

	ITS Graduates (N)	ITS Graduates[1] (%)	ITS Graduates[2] (%)	Female (%)	Disadvantaged background (%)
Mechatronics	16	72.7	84.2	0.0	31.3
Chemistry	14	70.0	100.0	21.4	21.4
Tourism	8	34.8	100.0	50.0	12.5
Total	*38*	*58.5*	*92.7*	*18.4*	*23.7*

Source: own elaboration on ITS students data

Notes: [1] percentages shown in second column are computed over the number of students enrolled at the beginning of the course; [2]percentages shown in the third column are computed over the number of students enrolled at the beginning of the second year.

The composition of the graduates by gender and socio-migratory background confirms what was seen above concerning the composition of the students and its changes over the two years. For instance, the percentage of female was higher in the ITS in tourism (50.0%), where women were also a relevant proportion of the students enrolled at the beginning of the

course as well as of the new entrants. Moreover, the percentage of graduates from a disadvantaged background was higher in the ITS in mechatronics (31.3%) and it also increased with respect to the proportion of those enrolled at the beginning of the course (22.7%, see tab. 4.1 above). Indeed, none of them left the course during the first year – differently from those with a more advantaged condition – and one student over the three that joined the course after its start belonged to this social group.

According to our interviews, the disadvantage of students did not arise only from migratory or socio-economic background. For instance, several students of the ITS in mechatronics had fragile family conditions or had experienced episodes of unemployment, inactivity and bad jobs during the period between the end of upper secondary school and the beginning of the ITS, putting them at risk of accepting unqualified job opportunities and to drop out the course in order to economically support their family. The extensive mentoring activity made by the course tutors, who constantly assisted and supported these students, helped them to remain in the course and get the final degree (int17ab). Moreover, among the students in the ITS in tourism, some disadvantages were related to personal and cognitive issues, such as relationship problems, emotionality and speech disorders. On the contrary, the students with a migratory background were brilliant in both classroom and on the job activities (int16bc). In general, the enrolment in the FoY courses was very important for these students, as it gave them the opportunity to experience new environments – in some cases otherwise prevented –, as well as to interact with people interested in learning and develop a life plan for the future.

Concerning the educational performance, table 5.2 shows that the average final mark was higher in the ITS in tourism (89.88) and mechatronics (89.06) than in the ITS in chemistry (84.07). As it is usual, female students got better marks than male, especially in the ITS in the field of chemistry, where the average final mark was 86.33 for the former and 83.45 for the latter. There were no relevant differences according to the socio-migratory background, with the exception of the course in mechatronics, where students coming from disadvantaged background achieved much lower results than others: the average final mark was 84.60 and 91.09, respectively. Finally, it is important to mention that none of the students failed the final exam. All those students that were admitted to the exam got a final mark higher than 70 – which is the threshold to be passed – and attained the ITS degree.

Table 5.2. Average final mark, by gender, socio-migratory background and FoY course

	Mechatronics	Chemistry	Tourism	*Total*
Gender				
Male	89.06	83.45	89.00	*87.06*
Female	.	86.33	90.75	*88.86*
Socio-migratory background				
Not disadvantaged	91.09	84.18	89.86	*88.17*
Disadvantaged	84.60	83.67	90.00	*84.89*
Total	*89.06*	*84.07*	*89.88*	*87.39*

Source: own elaboration on ITS students data

5.2 The employment outcomes

The final exams took place in July 2018 for the ITS in mechatronics and tourism and in December 2018 for the ITS in chemistry. Contact persons in the foundations were interviewed in December 2018-January 2019 in order for us to be able to get information on, among other things, the current employment condition of their ITS graduates. Table 5.3 shows that all the graduates in the ITS in tourism were already employed less than five months after the final exam. The percentage of employed – six months after the degree – was very high also among the graduates in mechatronics (93.8%): only one student was not employed, because he enrolled in university. The employment rate was much lower for people graduated in the ITS in chemistry, but this is explained by the very short time elapsed from the end of the course

to the moment when information concerning employment was gathered[20]. However, less than one month after the final exam, 6 graduates over 14 were already employed (42.5%) and according to our key informants the others were likely to find an employment in the very short-run. Indeed, one student was supposed to be hired by the same company where he did his internship, but in the end the company had unexpected problems related to orders not allowing the immediate recruitment. Moreover, the placement staff of the Foundation *ITS Nuove tecnologie per la vita* was contacted by a company in the rubber industry that did not participate to the course, which was likely to hire at least one or two ITS graduates in its staff (int18b).

Table 5.3. Employment outcomes, by FoY course

	Employed (N)	Employed (%)	Same company (%)*
Mechatronics	15	93.8	60.0
Chemistry	6	42.9	100.0
Tourism	8	100.0	75.0
Total	*29*	*76.3*	*72.4*

Source: own elaboration on ITS students data

Notes: *percentage of ITS graduates currently employed that work in the same company where they did their internship or apprenticeship.

Table 5.3 also shows that most of the employed graduates were working in the same company where they did their internship or apprenticeship, especially if we look at the ITS in chemistry. This confirms the high level of satisfaction of the companies hosting ITS students during the course (see below), making them to decide to extend graduates' contracts. Among the (currently employed) graduates in mechatronics and tourism, 40.0% and 25.0% changed job and company after the final exam. This has not to be considered as a bad indicator. On the contrary, it confirms the importance of the ITS degree as a credential to be used in the labour market, helping ITS graduates to move across different occupations within the reference industry (int16a, int17a).

Table 5.4 shows the percentage of employed graduates with different type of contracts. Concerning the ITS in mechatronics, around four out of five (currently employed) graduates worked with a permanent contract (73.3%), whereas the remaining ones had a fixed-term contract (26.7%). This confirms the very good outcomes of this course, and it also shows the positive effects of introducing the apprenticeship during the second year. Indeed, all the apprenticeship contracts of those who decided to remain in the same firm were automatically converted in permanent employment contracts, after getting the ITS degree.

Concerning the ITS in tourism, 25.0% worked with a permanent contract, 25.0% with a fixed-term contract and 37.5% with an apprenticeship contract, whereas only one student had an on-call employment contract. It should be mentioned that two out of the three apprenticeship contracts belonged to students who were already working in the same firm before the enrolment.

Finally, among the graduates in the ITS in chemistry, 66.7% worked with an extra-curricular internship, whereas 33.3 with a fixed-term contract. Despite the high number of graduates still in internship, the key persons in the Foundation *ITS Nuove tecnologie della vita* confirmed that, at the end, these additional months of on-the-job training will be likely to be converted in research apprenticeships contracts (int18b)[21].

[20] We decided not to present differences in employment according to gender and socio-migratory background for two reasons. First, since all the graduates in the ITS in mechatronics and tourism were employed, by definition there was not any variability in the probability of being employed. Moreover, for the same reason the composition of the employed would have been equal to the composition of the graduates, which was already shown in table 2. Second, differences in the (quantity and quality of) employment would be biased by the very short time between the final exam and the interview concerning the ITS in chemistry, not allowing us to reach reliable conclusions.

[21] Research apprenticeships are another type of apprenticeship (III level) contract, primarily linked to research projects within companies.

Table 5.4. Type of contract of employed graduates, by FoY course

	Permanent contract (%)	Fixed-term contract (%)	Apprenticeship (%)	Internship (%)
Mechatronics	73.3	26.7	0.0	0.0
Chemistry	0.0	33.3	0.0	66.7
Tourism	25.0	25.0	37.5	0.0
Total	*44.8*	*27.6*	*10.3*	*13.8*

Source: own elaboration on ITS students data

Finally, it is interesting to mention that most students characterized by socio-migratory disadvantages or other types of penalties were already employed at the moment of the interview. Even in the ITS in chemistry there was an immigrant student that remained in the company where he spent the period of on-the-job training, whereas among those who were not employed yet, some were being interviewed for a job and others had good recruitment prospects in the short-run. This confirms that enrolment in the ITS gave the opportunity to these young people not only to get a qualified educational title, but also to enter the labour market shortly after the end of the course.

5.3 The evaluation of internships and apprenticeships

At the end of the period of on-the-job training, an evaluation form was submitted to companies' tutors mentoring the ITS students during internships and apprenticeships. Table 5.4 shows their evaluation of the technical skills, soft skills and personal attitudes of students, broken down by gender and socio-migratory background[22]. Each index was computed by summing up the scores – ranging from 0 to 5 – for each question and then dividing this sum by the number of questions, which varied according to the course and the student. The feedback of the companies was very good, especially concerning the soft skills (average score=4.16) and personal attitudes (average score=4.13). Evaluations were especially good for the students in the ITS in mechatronics, whose average scores were 4.43 as for technical skills, 4.65 as for soft skills and 4.56 as for personal attitudes.

Our interviews clearly confirmed the satisfaction of companies. For instance, all those students hired with an apprenticeship contract by SAIEM and SITAV were offered a permanent employment contract after the end of the course, although some of them declined (int11). Moreover, the three students hosted by Datwyler got very good feedback by their internship tutors, especially concerning the technical skills transmitted by the ITS in chemistry and their ability to get integrated in the company, showing a good understanding of the differences between school and the labour market (int15ab). The company benefited from their work, evaluated them to be highly-skilled and immediately productive, and offered them the opportunity to extend their on-the-job training with an extra-curricular internship lasting six months as well as giving them priority in case of hirings following possible resignations of employees. The high satisfaction with these students was then confirmed by the company's will to hire them with an employment contract and, in case this would not be possible, to 'sponsor' them among other companies belonging to Assogomma (int15b).

Finally, also the company interviewees involved in the ITS in tourism were totally satisfied. For instance, given their good skills, willingness and rapid integration in the company, one of them offered the student the opportunity to extend his stay in the company with a 3-months

[22] Soft skills and personal attitudes to be evaluated were the same in all the three courses. For instance, internship tutors evaluated skills of problem solving and team working, among the soft skills, and skills of flexibility and sense of initiative, among the personal attitudes. Technical skills were specific to each course and in some cases differed according to the actual training underwent by students, even in the same course. For instance, among the technical skills to be evaluated were the ability to do basic mechanic and electrical maintenance of trains – or other vehicles for the ITS in mechatronics; the ability to identify the correct material for the required application for the ITS in chemistry and the ability to define and manage relations with customers and suppliers for the ITS in tourism.

internship followed by a fixed-term or permanent contract. The student decided not to accept the offer, but the interviewee claimed to be available for future contacts (int12).

Table 5.5. Evaluation of internships and apprenticeships, by gender, socio-migratory background and FoY course

	Mechatronics	Chemistry	Tourism	*Total*
Technical skills				
Male	4.43	3.42	4.15	*4.00*
Female	.	3.56	3.15	*3.35*
Not disadvantaged	4.50	3.33	3.51	*3.82*
Disadvantaged	4.25	3.89	4.33	*4.13*
Total	*4.43*	*3.45*	*3.65*	*3.89*
Soft skills				
Male	4.65	3.58	4.33	*4.22*
Female	.	3.56	4.11	*3.83*
Not disadvantaged	4.76	3.36	4.07	*4.06*
Disadvantaged	4.40	4.33	5.00	*4.44*
Total	*4.65*	*3.57*	*4.22*	*4.16*
Personal attitudes				
Male	4.56	3.61	4.67	*4.22*
Female	.	3.89	3.44	*3.67*
Not disadvantaged	4.58	3.42	3.87	*3.98*
Disadvantaged	4.53	4.56	5.00	*4.59*
Total	*4.56*	*3.67*	*4.06*	*4.13*

Source: own elaboration on ITS internships and apprenticeships evaluation data

Gender differences show that male students were evaluated slightly better than female students, but the result depends on the evaluation of technical skills and personal attitudes coming from the ITS in tourism. Differences by socio-migratory background show that disadvantaged students got on average better assessment, with the exception of the ITS in mechatronics, where differences were much smaller. For instance, the soft skills (personal attitudes) gap was equal to 0.97 (1.04) in the ITS in chemistry in favour of students coming from disadvantaged backgrounds. The gap is similar – and also extends to technical skills – in the ITS of tourism, but this depends on only one person with a migratory background among the assessed students, who got very high scores in each item. In general, this picture is confirmed by our interviews, showing a full satisfaction of the company towards this student, especially because of her technical skills, commitment and ability in relating to colleagues (int13). She did a very good job and was very helpful to the staff, pushing the hotel to offer her an on-call employment contract and, later, an apprenticeship contract.

Also the disadvantaged students enrolled in the ITS in chemistry performed very well in companies. Internship tutors and companies' managers appreciated their school preparation and the change in attitudes they showed once entered in the company, giving them priority in future recruitments or also immediately extending the period of on-the-job training (int15ab, int18ab).

5.4 The advantages of companies in the collaboration with the ITS

Not only did the surveyed companies appreciate the ITS students, they also liked working with the ITS foundations in general. The main benefits they acknowledge to have taken from that work were economic. Indeed, by collaborating with the ITS they could save money (and time) in the process of recruitment – although, in fact, we have seen that most of the companies interviewed the candidates and actually selected the students to be hosted in their on-the-job training – and in the remuneration. For instance, companies such as SAIEM

were supported by the ITS in mechatronics in recruiting people in a territory (Milan) where it had always been difficult to recruit human resources for the railway sector, considering its very high demand but low supply (int11). Moreover, the companies collaborating with the ITS in chemistry and tourism who did not activate apprenticeships claimed that the costs related to remuneration of students in internships were very low – and limited, as defined by law, to expenses refunding – and not comparable to the pay of dependent workers (int12, int15a).

Economic benefits concerning the remuneration were also found by those companies linked to the ITS in mechatronics who hired students in apprenticeships (int11). Indeed, companies hiring people with apprenticeship (III level) contracts get a number of benefits concerning the remuneration. For instance, they do not have to pay for hours that apprentices spend in external training (i.e. in school), whereas hours spent in internal training (i.e. on the job) are paid only 10%. According to the agreement concluded by Confindustria and the major Italian trade unions (CGIL, CISL and UIL), moreover, the remuneration of the working hours of apprentices corresponds to the pay given to workers in a lower job category (two levels less during the first half of the contract, one level during the second half or if the duration of the contract is less than one year). Furthermore, employers using apprenticeships have benefits related to their social security contributions (11.61% for apprentices rather than 32.70% for permanent workers) and taxes (costs related to apprentices' training are not considered in the computation of IRAP, the regional tax on companies).

Companies also had economic benefits deriving from the immediate productivity of students on the job, thanks both to their personal skills and to the quality of training transmitted by the school. This made the ITS students who spent a period in internship to be the best candidates to fill possible vacancies in the company (int13, int15ab).

Finally, one interviewee especially appreciated the opportunity that ITS gave to expert workers to become instructors in the courses. Indeed, this was beneficial not only to students, who experienced different vocabulary and types of teaching, thus beginning to understand in advance some characteristics of the organisations who would hire them, but also to the teachers themselves, who were glad to be important for the training of young people (int15a).

5.5 The final evaluation and the future objectives of the FoY courses

Our interviews with the contact persons in the ITS foundations as well as with the companies involved in the FoY project suggested a number of strengths and weaknesses of the three FoY courses. Concerning the *ITS Automazione e sistemi meccatronici autoferrotranviari*, three main strengths were outlined. First, in line with one of the main aims of the FoY project, the opportunity to hire students with an apprenticeship contract was confirmed to be very important, since it allowed young people to become dependent workers in the hosting company (int17b), thus reproducing the key feature of the dual system characterising the "collectivist" skill production system of Germany (see section 1 above).

On this respect, companies surveyed – who renewed their collaboration with the ITS for the new editions, again hosting students for internships and apprenticeships – mentioned, as a suggestion for the legislator, the possibility to convert the apprenticeship (III level) contract in an apprenticeship (II level) contract (*apprendistato professionalizzante*), once students get the ITS degree. According to the Italian law, indeed, if workers and employers do not terminate the contract at the end of the period of apprenticeship, it is automatically converted in a permanent employment contract. Giving companies the chance to convert it into another type of apprenticeship (until the maximum duration of the contract, i.e. three years) would give them more time not only to benefit from the advantages of this contract but also to better evaluate the ITS graduates they hired (int11).

The second strength of the course was the provision of the licence to work in the maintenance of trains, through training plans strictly defined by the ANSF and exams corresponding to various key components of a train (*organi di sicurezza*). This was important not only for students, who managed to achieve during the course a number of certifications which became crucial credentials in the labour market, but also for companies, who now know that in the ITS a number of specific licences related to the maintenance of trains might be awarded, and might increase their attention to ITS courses because of this (int17b). Finally, the ITS foundation considered the relationship with companies to be very positive in most cases, although some of the companies did not accept the solution to balance training at school and on the job. Thus, they "poached" the students they were hosting as apprentices, letting them drop out the course before its conclusion (int17a).

Although the possibility of the ITS students being hired as apprentices was one of the core features of the FoY program, some companies were not welcoming it, since to them it was a more binding type of on-the-job training. However, the ITS foundation intensively supported companies in gaining better information and knowledge of the apprenticeship contract, thus *de facto* providing an important service for the territory (int17b). A similar 'cultural' action was carried out towards the large firms of the transport maintenance industry and the large municipal transport companies (e.g. ATM, ATB etc.), despite the rule is normally to let new job vacancies through public calls. The ITS foundation arranged several meetings with such companies, in order to find a way by which the ITS students would get priority in case of recruitment, and thus laying the foundations for future collaborations. Indeed, thanks to this action, during the following edition of the same course some students spent a period of internship in these companies (int17a).

To sum up, the course was considered to be a very successful experiment and, as already mentioned, the Region renewed its financial support in order to repeat it, with two small changes. First, the training concerning the 'automotive part', here implemented during the second year, was partially included in the program of the first year, in order to give to the students the opportunity to know earlier both the 'worlds' (train and automotive) and choose their preferred one with enough information before the start of their apprenticeship. Second, the school component of apprentice training was reinforced by making it more continuous over the second year, devoting to it one week per month. Thus, the relationship between the ITS foundation and the students remained stronger also during the second year, thus lowering the risk of dropout (int17a).

Concerning the *ITS Applicazioni industriali della gomma e del PTFE*, the main strength outlined by the Foundation was the possibility to combine theoretical skills and practical experiences, which in turn positively affected the performance of students and contributed to their personal development. Moreover, the course was an opportunity to link the educational system with the labour market, working together with companies through their involvement in the establishment and management of the course (int18a).

Like the ITS in mechatronics, also the ITS in chemistry had troubles in activating apprenticeships – and actually did not manage to (see chapter 4) –, primarily because companies thought such contracts to be binding, and thus that their use would not allow them to evaluate people before the final hiring decision (int18a). The ITS foundation also claimed that labour consultants discouraged the use of the apprenticeship (int18b), probably because they are focused on the short-term costs and benefits of a company, and do not have a long-term vision of its possible development[23]. However, thanks to this year's course, and learning from the experience, the foundation managed to lay the foundations to include the apprenticeship in future courses, possibly as soon as in 2019 (int18a), and also discussed with companies the possibility to activate research apprenticeships, a different

[23] Given their small average size, a number of Italian firms outsource the administrative component of their personnel management (which is quite complicated because of multiple and often chaotic labour laws and regulations) to labour consultants, professionals who do the administrative work required by law and advice firms on the best ways to exploit the many loopholes and biases of labour regulations.

form of apprenticeship contract (int18b). Moreover, although the surveyed company – who still collaborates with the Foundation providing both teaching at school and on-the-job training in the course held in Bergamo – could not activate the apprenticeship because of budget constraints, interviewees appreciated this opportunity, which might be especially useful for students to be more integrated into the company (int15ab).

More in general, the ITS foundation considered the course a success story, especially concerning the decision to replicate a course already well-established in Bergamo in a different environment such as Milan, and claimed that, despite the difficulties, it was important to invest by laying strong foundations for future activities. Although the course was not repeated the following year, there were still meetings between the Foundation and the companies, and Assogomma declared its interest for the course to be re-activated next year (int18a).

Finally, as already mentioned, the *ITS Food and beverage manager nelle strutture turistico-ricettive* had to deal with two main critical issues. The first was related to the apprenticeship contract. Unlike in the case of the other two courses, however, this problem was, at least partially, explained by normative issues. Indeed, on the one side, the profile of the food and beverage manager, as defined by the MIUR, was considered to be the one of a manager by the industry's labour contract. On the other side, Italian hotels' personnel policies are not accustomed to hire young people for intermediate, qualified positions without having the newly hired experience the various steps of on-the-job training, starting "from the bottom", that is from the less qualified tasks[24]. On this respect, it was suggested to change the term defining the position, turning into something like "skilled technician" instead of "manager", in order to avoid issues related to the use of the latter term (int16a).

The second issue was related to the very high dropout rate, primarily of students that were already working before the enrolment or who found a job during the course. According to the interviewees in CAPAC and Galdus, the two main training providers involved in the design and management of the course within the Foundation *ITS Innovaturismo*, this was explained by the unavailability of some companies, especially small or medium ones, to get involved in collaborating with a training project. Therefore, they did not accept that students would not have been working full-time for them and sometimes were not available to transmit those skills required in order to get the ITS degree (int16ab). Consequently, students had to choose between the course and a job, and they often decided to keep on working and to leave the course. However, it seems that the situation is changing, also because of the diffusion of information on the ITS and of a new *forma mentis* about it, and some people are now attending the new courses organized by the Foundation despite being employed in a company (int16a).

However, such weaknesses turned out to be crucial opportunities to improve the course, for both the Foundation and its external partners, as well as the Foundation's expertise in courses design and management. Indeed, the ITS established in the frame of the FoY project enabled the Foundation to learn how to deal with problematic issues and force it to create new solutions and strategies, which are now well-established and used even in other ITS courses (e.g. documentary kit for the recognition of the time spent working in a company for training purposes; creation of new pathways into the course from other experiences etc.).

Concerning the future objectives, surveyed companies were interested to maintain their relationship with the Foundation, especially for further internships (int12, int13). However, the course was not repeated yet: the Foundation *ITS Innovaturismo* is still going, offering a different course (*ITS Hotel Manager - Tecnico superiore per la gestione delle strutture turistico ricettive*), whereas the *ITS Food and beverage manager nelle strutture turistico-ricettive* will be repeated when some companies will be available to finance it.

[24] It is useful to note that the Italian use of the English term "manager" refers only to top-rank, high-wage positions in big companies, while in English it is also used for middle-level positions. For instance, in Italy a shop manager would not be called this way (the Italian term *responsabile*, meaning "in charge" would be instead used).

Conclusion

The main aim of the "Focus on Youth: develop ITS employability" (FoY) project, promoted by Assolombarda Confindustria Milano, Monza e Brianza, Lodi, with the support of the JPMorgan Chase Foundation, was to design a model of Higher Technical Education – more specifically, of the *Istituti Tecnici Superiori* (ITS - Higher Technical Institutes) – in Italy, as a vocational training school able to facilitate the transition of young people towards the labour market. Given the limited public resources normally available for financing these courses, Assolombarda deemed it necessary to enhance the operational and financial capacity of ITS by encouraging greater corporate involvement and a more structured partnership with companies, including the opportunity of higher apprenticeships. Consequently, the FoY project financed three experimental courses, aiming at promoting the use of apprenticeship contracts in vocational courses, in order to create a model to be applied at a larger, national, scale. By hiring the students as apprenticeships during the second year, the courses would then become closer to the arrangement typical of the German VET system, called *dual system* as it is based on both school-based and company-based training.

By directly involving companies and employers' association in the conception, design and management of the courses, the dual system provides a stable relation between schools and labour market. Such a relation enables schools to conceive and design courses providing students with up-to-date skills required by the labour market, and this in turn favours a smooth transition from school to work. Moreover, given the practical orientation of teaching, such courses provide a school path for those students whose disadvantaged background is often associated with problems in the context of the mostly academic training prevailing in Italian higher education.

After presenting the general context of vocational training in Italy and providing up-to-date evidence analysing the national micro-data on ITS collected by INDIRE, this report presented an in-depth study of the three courses developed in the project, from their conception until their final outcomes. Here we briefly recap the picture and compare the outcomes of the courses, as we were able to observe them by the end of 2018.

The *ITS Automazione e sistemi meccatronici autoferrotranviari*, activated in the field of mechatronics by the Foundation *ITS Lombardia Meccatronica*, largely met the targets of the FoY project. On the one side, this course had a very low dropout rate, leading more than 7 students out of 10 to get the ITS degree. On the other side, the Foundation managed to activate apprenticeship contracts nearly for all the students, giving them the chance to be hired by a company already during the course and also increasing their opportunities of being employed after the final exam. Indeed, the employment rate of its graduates few months after the end of the course was very high and most employed students worked with permanent employment contracts.

Moreover, the ITS in mechatronics attracted a relatively high proportion of students from a disadvantaged background – in terms of migratory status, family of origin, family condition, previous experiences of unemployment or inactivity etc. –, who performed well in the course, thanks also to an extensive mentoring activity provided by the course, and also had good employment outcomes. Thus, ITS courses like this one might be especially useful for young people whose disadvantaged background fails to provide them with those resources who are helpful in order to find employment in qualified jobs (e.g. social networks, parental motivation etc.). In other words, by regulating the school-to-work transition, the ITS course in mechatronics allowed to reduce those inequalities shaped by ascribed factors such as country of origin and socio-economic background.

The reasons behind the comparative success of this course are to be found in the strength of the Foundation and its main partners, who have been since long working in vocational education, and are thus well embedded in the local economy, with good relationships with the companies and all collective socio-economic actors and institutions. With the advantage of such an embeddedness, the ITS course presented very good outcomes in all its facets.

The *ITS Applicazioni industriali della gomma e del PTFE*, activated in the field of chemistry by the Foundation *ITS Nuove tecnologie della vita*, was also quite successful, especially if we consider the very low dropout rate and the strong effort in involving companies in all the phases of the course. Unfortunately, figures regarding the employment outcomes of its graduates cannot be compared to the other two courses, since the ITS in chemistry was delayed and it finished five months later than the remaining two, less than one month before the conclusion of our fieldwork. However, the proportion of graduates already working (more than 40%) and the direct working contact between the placement staff of the foundation and a number of companies in the rubber industry suggest that the full employment rate is very likely to be attained within the next few months.

A very interesting feature of this course, one to be carefully considered for policy purposes, is that this course was a replication in the Milan area of a course already successfully organized in Bergamo, a nearby town. To be true, it has to be noted that the few weaknesses of the course might be explained by the lower embeddedness of the Foundation in the new context and by the time required to establish fruitful networks of trust with the socioeconomic actors of the territory. However, the good outcome of the course showed that it is possible for a successful ITS foundation, organizing well-performing courses (providing good educational and employment outcomes of the students, by means of good connections with companies and high corporate involvement in the courses etc.), to migrate well-established courses to new environments and provide new successful experiences.

A process of geographical diffusion of good VET practices appears thus to be possible. Of course, a question should now be raised. While the move from Bergamo to Milan was not very difficult, given the similar socioeconomic context, with thriving businesses and experienced technical schools used to collaborate with companies, what would have happened with a move towards less advantaged environments, such as for instance Southern regions? We have seen (chapter 2) that the geography of the ITS is similar to the one of Italian socioeconomic development, with few experiences in the Southern regions, so the diffusion to the South of successful ITS experiences from the North and the Centre might be an important means to help them to settle down in Southern regions.

Finally, the *ITS Food and beverage manager nelle strutture turistico-ricettive*, activated in the field of tourism by the Foundation *ITS Innovaturismo*, appears to have been relatively less successful than the previous ones, since it had to deal with a number of issues, namely a very high dropout rate, especially for those students who found a job during the course or were already working before, and a number of difficulties in the activation of the apprenticeship contracts. Three appear to be the main causes of such a result.

First, the definition of the skill profile of this course as the one of a “food and beverage *manager*” gave a lot of problems, since it discouraged companies to use the apprenticeship contract, since it is not possible to hire young people still attending education as “managers” in hotels. The Italian custom is to define “managers” only top-level executives, not middle-level qualified positions as this one. So, the suggestion arose to give this course, and this profile, a different name, such as “higher technician in the hospitality sector” or something around these lines, in order to align the official name of the course to the customary terminology of the industry.

Second, the hospitality industry is primarily characterised by internal labour markets, where the entry ports are mainly low-qualified jobs, and thus lacks initial training for technicians or medium-skilled workers, such as those graduated in ITS. This means that young people, even if they hold a post-secondary degree, are compelled to enter the hotels starting from the less

qualified tasks. This type of career development might be efficient in a stable organization, facing stable markets, but might be suboptimal in the face of the current market volatility, requiring flexible organizations able to cope with short-time important market and organizational changes. For instance, banks used to hire all new entrants as front-desk tellers, and the best ones would then make their way to the upper corporate ranks, but this is not the case anymore: now qualified young hires are directly inserted in middle- and top-level position, so that careers might be faster. In the hospitality industry, this means that ITS students, once they have a job, might have few incentives to graduate and achieve the final degree, since its achievement would not change their career in the firm. The possibility should thus be considered, to adapt the ITS framework to the features of the industry by conceiving shorter-term courses (e.g. one year), with a stronger focus on internships (with respect to school-based training) and providing an earlier allocation of students to companies.

Third, given the industry's HRM practices are mostly based on on-the-job training, a number of small and medium companies (which make up most of the business) where students were employed or spent their period of on-the-job training were hardly available to collaborate with the Foundation in order to design personalized programs helping them to conciliate work and study. Faced with a choice between school and a job, most of the students opted for the latter and left the course.

More generally, and whichever the outcomes of the courses, however, the FoY project provided crucial opportunities for the improvement of ITS course. From this point of view, the hiring of students as apprenticeships was crucial. Indeed, for the first time the key feature of the German VET system, that is the fact that its students are hired by companies as well as enrolled in schools, was the core focus of an Italian course.

Of course, the scarce familiarity of Italian companies with such a model means that in general many of them are not culturally ready to apply the dual model, primarily because they do not know the regulation concerning apprenticeships or consider it to be very demanding and expensive. However, during the FoY project the ITS foundations provided an important service to the territory by intensively supporting companies in the knowledge of the apprenticeship and of its advantages, thus increasing the likelihood not only to apply the dual model in further editions of the FoY course, but also in other future ITS courses. For instance, the Foundation *ITS Lombardia Meccatronica*, which managed to activate apprenticeship contracts for most of its students already during the FoY course and considered it to be a very successful experience, decided to replicate the dual model also in the second edition of the course, and is currently planning to extend it to other courses organized by the foundation (e.g. an ITS in Industrial mechatronics in Brescia, an industrial town some 100 km east of Milan).

In order to encourage companies to use this model it is important to change their perception of the apprenticeship as nothing more than a demanding and expensive alternative to the internship. A useful idea might be a small regulatory change introducing the possibility to turn the apprenticeship (III level) contract, the one used in ITS courses, into a different contract, the apprenticeship (II level) contract (*apprendistato professionalizzante*), once students graduate. Current regulation, to the contrary, provides that at its end the apprenticeship contract is not renewable, but is automatically converted into a permanent employment contract. Enabling companies to convert it into another type of apprenticeship contract (with a maximum duration of three years) would give companies more time to benefit from the advantages of this contract and to gain a better evaluation of their new hires before hiring them on a permanent base. It is well-known that the Italian employment contract provides high firing costs, and this often discourages its use on the part of companies, so the possibility to fire with low costs the employee, which is a part of the apprenticeship contract, should incentivise hirings.

Moreover, it should be mentioned that, as vocational courses provide an *alternance* between work and study, even when they are hired by firms during the second course year (such as in

the ITS established by the FoY project) the risk always arises of companies exploiting this situation with an opportunistic behaviour, by 'poaching' students before they get their final degree. In the dual systems such as the German one, indeed, the key feature is the fact that VET students do not enrol into vocational schools, but are formally hired by firms as salaried apprentices since the beginning of the course. In other words, promoting the use of apprenticeships during the second year of the courses is crucial, but it still leaves the possibility of firms attracting students with full employment contracts. Of course, the key question from this respect is whether in the Italian context could be possible for firms to hire students from the beginning of the course, but this is not possible as long as the first course year is mostly spent at school.

Furthermore, the FoY project gave the opportunity to the ITS foundations to deepen the relationship with the corporate world, involving companies in the design and management of the courses. This helped to diffuse information about the ITS among firms, thus increasing the possibilities for students to have good internships and on-the-job experiences and to correspondingly increase their employability. Moreover, the involvement of companies in the various steps of the courses – as well as their high satisfaction towards the students – laid the foundations for future possible contributions and, crucially, for company-based funding. It is important to notice that this crucial progress is on the way, as in the case of the new edition of the *ITS Applicazioni industriali della gomma e del PTFE* held in Bergamo, which was totally financed by the *Associazione Produttori Guarnizioni del Sebino*, the local gaskets industry employers' association.

Moreover, FoY allowed foundations to widen their networks by establishing contacts with new firms. One example was the action carried out by the Foundation *ITS Lombardia Meccatronica* towards the large firms managing the maintenance and the large municipal transport companies (e.g. ATM, ATB etc.), which are constrained by law to fill their vacancies only by formal, state-regulated calls. The ITS foundation arranged several meetings with these companies, in order to find a way to let an ITS degree become a preferential condition for recruitment, laying the foundations for future collaborations. This is indeed what is happening in the new edition of the course, where some students are spending a period of internship in those companies, who did not participate to such courses beforehand.

Finally, the FoY project contributed to improve the ITS foundations' expertise in course design and management, as shown by the Foundation *ITS Innovaturismo*. Indeed, the ITS established in the frame of the FoY project had the merit to enable the Foundation to deal with a number of issues related to the implementation of ITS courses in an industry with many idiosyncratic features, and to conceive new solutions and strategies, which are now well-established and might be replicated in other ITS courses. Indeed, the adaptation of the ITS format to industries different from the ones it was conceived for, which are mostly manufacturing, is one of the key issues of the future.

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