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Returns to Higher Vocational Education in Portugal: The case of TeSP courses

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Abstract*

TeSP courses (*Curso Técnico Superior Profissional*) were introduced in Portugal in 2014. This study analyzes the labor market outcomes of TeSP graduates, focusing on employment patterns, wage premiums, educational fields and work areas alignment. Using data from *Quadros de Pessoal* dataset, the analysis finds that only 15.4% of TeSP graduates are employed in formal sectors, with 7% of them pursuing bachelor's degrees. TeSP graduates experience a wage premium of 14.34% compared to those with lower education, though it is smaller than for bachelor's holders (31.52%). The study highlights the role of TeSP courses in bridging vocational and higher education.

Keywords: Higher Vocational Education; Educational Returns; TeSP courses; Training-Work area matching

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1. Introduction

Ten years ago, in 2014, the higher education system in Portugal saw the introduction of a new type of program: TeSP courses (*Curso Técnico Superior Profissional*). These courses were designed to offer higher vocational education with a strong practical focus, closely aligned with labor market demands. In fact, "Higher vocational education plays a critical role in bridging the gap between academic knowledge and practical labor market skills, fostering regional economic development and addressing industry-specific needs." (Cedefop 2023)¹. Based on this, the primary goal of TeSP courses was to address the needs of regional companies by fostering synergies between educational institutions and employers in key sectors.

Despite the growing enrollment and visibility of TeSP courses, significant gaps remain in understanding graduates' perspectives. For instance, in November 2024, a study by PLANAPP² investigated the evolution of wages in Portugal by schooling level, but no reference was made regarding TeSP courses. Key questions concerning the effectiveness of these courses in meeting labor market demands and the alignment between fields of study and work areas remain unanswered. Therefore, it is crucial to explore these courses further, since their introduction a decade ago. This analysis is necessary to determine whether these programs align with labor market needs, as they serve as a potential bridge between vocational education and training (VET) at the secondary level and higher education degrees.

This report brings knowledge on what are the short and medium-term returns in terms of TeSP graduates, from earnings and field of work perspective. The following particular questions are addressed. First, where are the TeSP graduates? Are they working in companies, unemployed or do they continue to study to other degrees? Then, is there a wage premium of higher vocational education when comparing to VET secondary education and bachelor's degrees? Is

¹ "Synthesis Report The Future of Vocational Education and Training in Europe."

² Centro de Planeamento e de Avaliação de Políticas Públicas – República Portuguesa

it only for the first years after the graduation, and is there a pattern? And finally, do TeSP graduates work in their field of studies and do they take over higher positions in the company when compared to other graduates? Answering these questions will open space for more reflection about these courses.

This study is structured as follows. In section 2, relevant literature about higher vocational education is present. Section 3 introduces the context of the higher educational system and TeSP courses. Sections 4 and 5 present data analysis on TeSP enrolments and graduates, and employees with a TeSP degree in *Quadros de Pessoal* dataset, respectively. Section 6 is devoted to a descriptive analysis of the data, detailing the variables and outcomes of interest we consider in our analysis. On section 7 a matching between field of studies and work area, as well as a vertical matching, is presented and, finally, section 8 concludes.

2. Literature review

The returns to higher vocational education have been a subject of relatively little research when compared to the case of secondary vocational education. Böckerman, Haapanen, and Jepsen (2019) investigated the Finish higher vocational education returns in the labor market, focusing on vocational master's degrees. Using a matching model between students on these new introduced courses and non-students (a comparison group of students with similar probability of attending a vocational master's program), they found significant differences in earning gains across various study fields, with a wage increase for the ones that attended these vocational masters.

In the case of China, Dai and Martins (2024) compared polytechnic degrees to university degrees, finding a wage gap where polytechnic graduates earned much less than their university counterparts. This study highlights the undervaluation of polytechnic education in the Chinese

labor market and calls for policy interventions to enhance the status and perceived value of vocational education.

Other papers study the case of secondary vocational education. For instance, Oliveira (2014) examined the labor market outcomes of vocational education in Portugal. Her study compared individuals who completed secondary education in either general or vocational tracks. Initially, vocational education graduates earned more but, over time, those with general education surpassed them. This finding underscores the smoother transition from school to the labor market provided by vocational courses. Supporting this, Hampf and Woessmann (2017) noted that vocational education equips individuals with essential skills for a seamless transition from school to work, offering diverse alternatives to extend their years of study.

Ferreira and Martins (2023) assessed the impact of a significant expansion of vocational education and training (VET) courses in Portugal. They found that dropout rates among VET students decreased, suggesting that vocational education helps students continue their studies and enhance their skills. However, Hartog, Raposo, and Reis (2022) identified a negative wage gap between regular and vocational education graduates in Portugal, which fluctuates over time due to economic and policy changes. This gap indicates that vocational education graduates generally earn less than their peers with academic secondary education, influenced by labor market conditions and educational reforms.

TeSP courses in Portugal are mainly taught in Polytechnic Institutes that accentuate practical and vocational education (Taylor et al. 2008). Oliveira et al. (2019) highlighted the significant role of these higher education institutions in promoting regional economic development. This includes job creation and local spending by students and staff, particularly as students often relocate from other regions to study at Polytechnics.

While specific literature on the returns of TeSP courses in Portugal is scarce, Pinto De Carvalho (2022) found that these courses are chosen for their job market preparation and as an alternative

to higher degree courses. Despite this, the bachelor's degree (*licenciatura*) remains the primary goal for many students, indicating that TeSP graduates often aim to pursue further higher education. Tavares et al. (2024) explored the factors contributing the reluctance of vocational students in Portugal to pursue higher education degrees, finding that the lack of confidence in their academic abilities and financial constraints are significant barriers. The authors suggest that educational policies should be more inclusive and supportive of vocational students' needs and aspirations.

Wages are closely linked to the alignment between an individual's field of study and his job and research suggests that mismatches between education and employment can lead to lower earnings. Reis (2018) found a significant earnings penalty for workers in Brazil whose skills did not match the demands of their jobs, highlighting that workers with less transferable skills face greater wage penalties. Similarly, in Portugal, Lopes et al. (2023) explored the impact of mismatches between vocational education and training (VET) qualifications and labor market needs in the Leiria region. Their study indicated that such mismatches contribute to higher unemployment rates and recommended better alignment between VET programs and regional labor market demands to reduce these issues.

Most of the literature focus on the short-term impact of higher VET education. However, it is known that, in terms of education-job matching, several factors play a role. Olo et al. (2024) identified that final academic grades, participation in extracurricular activities, and the specific field of study all influence the probability of achieving a successful alignment between education and employment areas. In Portugal, their research found that graduates in fields such as 'social sciences, commerce, and law' and 'engineering, manufacturing, and construction' had a higher probability of matching their education with job opportunities, suggesting that these fields offer better alignment with the labor market.

3. Institutional context

3.1. The Portuguese higher education system

In 2005, the Bologna process led to a significant reform in Portuguese higher education, restructuring it into three cycles of study: bachelor's, master's, and PhD (Diário da República 2006)³. In 2014, a new cycle of study, connected to the 1st cycle of higher education was introduced, the TeSP courses.

3.2. About TeSP

TeSP, Higher Vocational Technical Courses (*Cursos Técnicos Superiores Profissionais*) is a short-in-time type of higher education (two years), that does not lead to a degree and was created by Decree-Law No. 43/2014. The target group of these courses are young people from 17 to 30 years and that have secondary education or a legal equivalent habilitation. Specifically, the primary target group for TeSP courses was young people who had completed vocational programs in secondary education (Fundação José Neves).

TeSP courses are offered at Polytechnic colleges (*Institutos Politécnicos*) and are structured into three key components. The scientific component accounts for 30% of the workload, while the technical component makes up 70%. Additionally, students undertake an internship lasting at least one semester, designed to provide practical training in the professional field related to their course. This internship gives students credits which also count towards their final grade.

Before these courses were introduced in Portugal, a similar program called *Bacharelato* existed. This was the first degree of higher education, prior to the Bologna Process, offered by Universities or Polytechnic Institutes, and lasted three years. However, with

³ Decree-Law n. 74/2006

the implementation of the Bologna Process in 2005, the *Bacharelato* degree was discontinued (Diário da República 2005)⁴. Following the Bologna reforms, bachelor's duration was shortened from five to three or four years, with only specific programs extending to four years.

One of the reasons to implement TeSP courses was to strengthen regionalization, allowing each institution to define his own course plan while developing closer relations with the local job market. Another key objective was to increase the availability of higher education in Portugal and access whether these new courses would encourage more individuals to pursue higher education rather than entering the job market after completing secondary education, with a particular focus on students from vocational secondary education.

Students that successfully complete TeSP courses receive a diploma that qualifies them at level 5 of the national qualifications' framework. They also have the opportunity to continue their studies to the bachelor through a special competition (*concurso*). The application requirements vary between Polytechnic Institutions and Universities. At Polytechnic Institutions, students must meet the specific conditions set by the institution they wish to attend. At Universities, students are required to pass the secondary school exams relevant to their chosen course. Each higher education institution can specify which TeSP diplomas or fields of study qualify for entry into their programs. Unlike the general national competition where students are ranked, in this special competition, TeSP graduates apply directly to each institution and are subject to the spots and criteria established by the institution.

To support the implementation of TeSP courses, funding is available through regional programs. In March 2023, *Portugal 2030* regional programs launched a funding line of 26.8 million euros from European Funds to assist higher education institutions in covering costs of TeSP courses that aligned with the regional priorities. The funding could provide up to 5,150€

⁴ Law n. 49/2005

per student, which was consider the cost of the two-year degree for each student (Portuguese Government 2023).

For courses offered by public institutions, a portion of the expenses is covered by the State Budget. In addition, tuition fees paid by students contribute significantly to finance these programs.

4. Data on TeSP

At the moment there are 1,110 (institution/area) courses of this type in Portugal, delivered in 134 institutions (public, private, or even military) (Direção Geral do Ensino Superior).

To analyze on the background of TeSP students, data from the Observatory of Secondary School Student Trajectories (OTES) is used. OTES is a survey conducted by the Directorate-General for Education and Science Statistics of the Ministry of Education and Science (DGEEC)⁵. Its longitudinal design allows for tracking students' paths over time, from secondary education to post-secondary education, university, or the labor market. This survey is initially conducted in secondary schools and then, approximately 14 months after, once students complete secondary school, another survey is conducted to evaluate their path. With data from 2017 to 2020, we found that the majority of TeSP students have graduated from professional courses, 76 percent, when compared to students with a scientific – humanistic background that account for 24 percent of students that are taking a TeSP course.

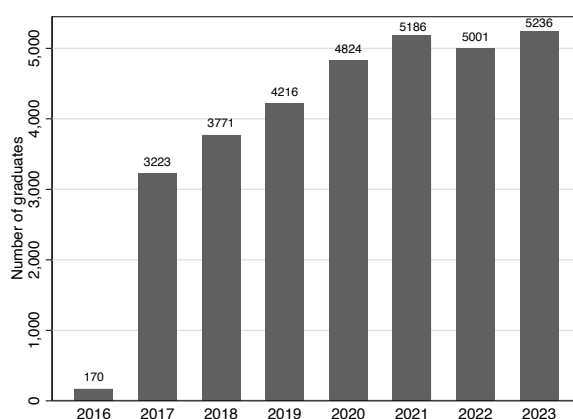
According to statistics from the Portuguese Ministry of Education, the number of students enrolled in TeSP courses increased from 2017/18 to 2021/22. In public institutions, enrollment rose from 10,293 to 15,622, while in private institutions, it grew from 2,487 to 5,124. This trend suggests that not all course vacancies may be filled, indicating potential gaps in enrollment.

⁵ Direção Geral de Estatísticas da Educação e Ciência

More men than women are enrolled in TeSP courses. In public institutions, 65% of the students are men, while 35% are women. In what respects to private institutions, 60% of the students are men and 40% are women.

Regarding the number of TeSP graduates, Figure 1 illustrates a significant increase from the first academic year of these courses, 2015/16, which had 170 graduates, to the following academic year, 2016/17, which saw a rise to 3,223 graduates. After that, there was a consistent, albeit small, increase each year, with the number of graduates reaching 5,186 in 2020/21. In 2021/22 academic year, there was a slight decrease in the number of graduates, dropping to 5,001, but one year later, there was again an increase to 5,236. It is important to note that the graduates of 2022 experienced two academic years during the Covid-19 pandemic, which may have contributed to the lower number of graduates. Additionally, the number of graduates is significantly lower than the number of enrolled students in these courses. For example, in the academic year 2020/21, there were 17,806⁶ students enrolled in TeSP, but only 5,180 graduates. Even with the growing number of enrollments, this suggests a potentially high number of dropouts.

Figure 1: TeSP Graduates per year of graduation



Notes: This figure represents the evolution of the number of TeSP graduates in public and private institutions between the academic years of 2015/16 and 2022/23. For example, for the academic year of 2015/16 the graduation is on the end of the academic year and so in 2016, the year presented in the graph.

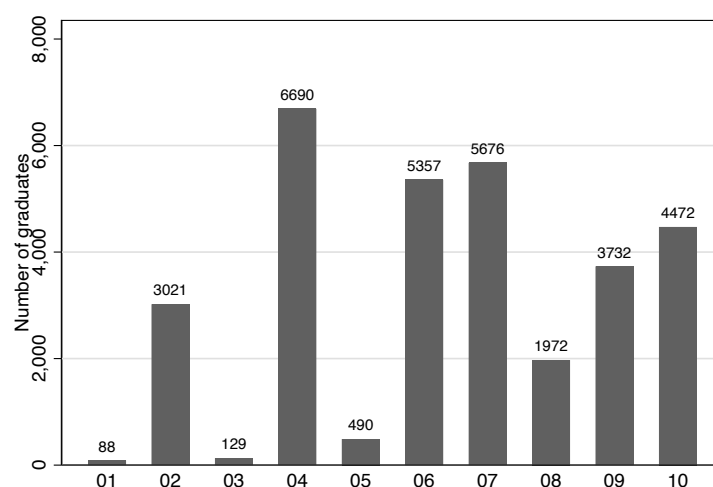
⁶ Sum of graduates in public and private institutions in Inforcursos (DGEEC)

In Portugal, higher education courses are divided into 10 groups of areas of education and training being: 0 – General Programs; 1 – Education; 2 – Art and humanities; 3 – Social science, commerce, and law; 4 – Science, informatic and mathematics; 5 – Engineer, transformation industries and construction; 6 – Agriculture; 7 - Health and social protection; 8 – Services; 9 – Unknown. These major groups are subdivided into areas of study that are then subdivided into areas of education and training.

In Figure 2, we compare the total number of TeSP graduates across academic years by major groups of education and training areas. Group 4 presents the most graduates over the years – Science, Informatics, and Mathematics, with 6,690 graduates, followed by Group 7 – Health and Social Protection. On the other hand, the groups with the fewest graduates are Group 1 – Education, with 88 graduates, and Group 3 – Social Science, Commerce, and Law, with 129 graduates.

Since the 2015/16 academic year, more than half of the TeSP graduates have come from three major groups of education and training areas: Science, Informatics, and Mathematics; Agriculture; and Health and Social Protection.

Figure 2: TeSP Graduates from 2015/16 to 2022/23 by training area



Notes: The figure represents the sum of the total number of graduates from the academic year 2015/16 until 2022/23 by training area. Training areas are the following: 1 – Education; 2 – Art and humanities; 3 – Social science, commerce, and law; 4 – Science, informatic and mathematics; 5 – Engineer, transformation industries and construction; 6 – Agriculture; 7 - Health and social protection; 8 – Services; 9 – Unknown.

An analysis focused on the NUTS II regions (based on the 2013 classification) reveals significant disparities across the regions. The Azores have had the fewest graduates over the years, specifically 43. In contrast, the regions with the most graduates since the implementation of TeSP were Norte and Centro, with 10,908 and 7,886 graduates, respectively. Despite its large size, the Lisbon region ranks a distant third, possibly due to the abundance of university course opportunities available in its area (Table A.2).

An analysis of the number of TeSP graduates *per* polytechnic college shows that the institutions with the most TeSP graduates over the years are *Instituto Politécnico de Leiria*, with 3,983 graduates, and *Instituto Politécnico do Cávado e do Ave*, with 2,853 graduates. In contrast, *Escola Superior de Artes e Design* had only 6 graduates, and *Escola Superior de Saúde Norte da Cruz Vermelha Portuguesa* just 5. (Table A.3).

Regarding gender, there are more male graduates than female, which aligns with the gender gap in student enrollment. Since 2020/21, however, the percentage of female graduates has been slightly decreasing (Figure A.1).

5. Professional situation of TeSP graduates

Quadros de Pessoal is a matched employer-employee data base that contains information on establishments, firms and employees. The database has been available since 1985 and enables data analysis on various aspects, including the structure and location of firms, the number of employees, their remuneration, and the collective labor agreements that apply to them.

In this analysis, the sample is restricted to workers who are TeSP, bachelor or secondary school graduates covering the five-year period from 2018 to 2022, as no employer was registered as TeSP graduate before 2018. The data was also restricted to individuals under 38 years of age, as TeSP courses are targeted at students aged 17 to 30. The oldest students would have been 30

years old in 2014, making them 38 years old in 2022. Therefore, there was no need to include older employees who pursued a TeSP course after working for several years with a different educational background. Additionally, the sample was restricted to workers earning a base salary of 80% or more of the minimum wage in Portugal for each year.

Salaries were adjusted to 2022 real prices, considering the inflation rates in Portugal from 2019 to 2022 (0.34% in 2019, -0.01% in 2020, 1.27% in 2021, and 7.83% in 2022)⁷.

The first part of the analysis focuses on workers TeSP graduates, comprising 6,359 observations of 4,051 workers across 2,831 firms. TeSP graduates working in Portugal increased over the years, rising from 854 in 2018 to 1,834 in 2022. In terms of gender distribution, there is a balance between male and female workers, although males slightly predominate in the last three years, as they were predominant in terms of graduations (Table A.4).

Before diving into more specific analysis, it is important to highlight a key finding. Between 2016 and 2022, 26,391 students graduated from TeSP courses. However, only a small proportion of these TeSP graduates are employed as a TeSP graduate in *Quadros de Pessoal* database. Specifically, only 15.4% of all the 26,391 TeSP graduates between 2016 and 2023 appear in the *Quadros de Pessoal* database as TeSP graduates between 2018 and 2022. This suggests that these graduates either are finding difficulties in getting a job, find jobs outside the scope of this dataset (e.g., self-employment or civil service), work abroad (or remotely from Portugal), or continued their studies. It is also possible that some firms incorrectly classified these individuals in the survey as secondary school or university graduates.

The total number of TeSP graduates employed in *Quadros de Pessoal* is significantly higher than the number recorded each year. For example, this sample includes 4,051 workers who appear as TeSP graduates at least once, but the highest number of TeSP graduates recorded in

⁷ Inflation rates provided by Pordata, 2024

a single year was 1,834 in 2022. This suggests that many workers reappear in the records later with different qualifications, such as a bachelor's degree. The value is just nearly 7% of the total diplomates over the last years indicating that a large proportion of graduates are not continuously employed in the job market as TeSP graduates.

One of the unique features of TeSP courses is that students can graduate and then continue their studies toward a bachelor's degree (*licenciatura*). A longitudinal analysis reveals that 276 workers initially recorded with a TeSP qualification later appear with a bachelor's degree. This represents 7% of the total TeSP graduate employees in our sample (after applying age and minimum wage restrictions). This finding suggests that a significant number of TeSP graduates continue their education to obtain a bachelor's degree.

DGEEC data on higher education graduates, RAIDES (*Registro de Alunos Inscritos e Diplomados do Ensino Superior*) is an annual survey at the national level that collects data from all the Higher Education Institutions. Considering the academic years from 2010/11 to 2021/22 We found that 26,274 students have graduated from a TeSP degree. Additionally, from 500,285 bachelor's graduates, 4,579 had previously completed a TeSP course. This is another important finding, as it highlights that a significant number of TeSP graduates continue their education, with approximately 17.4% of bachelor's graduates having a TeSP degree as their previous qualification (Tables A.5 and A.6).

TeSP graduates in *Quadros de Pessoal* database are employed across a wide range of occupations. The most common occupations are computer programmer, nurse, administrative technician, and physiotherapy technician/physiotherapist, as shown in Table 1.

Table 1: Top Professional categories of TeSP graduates

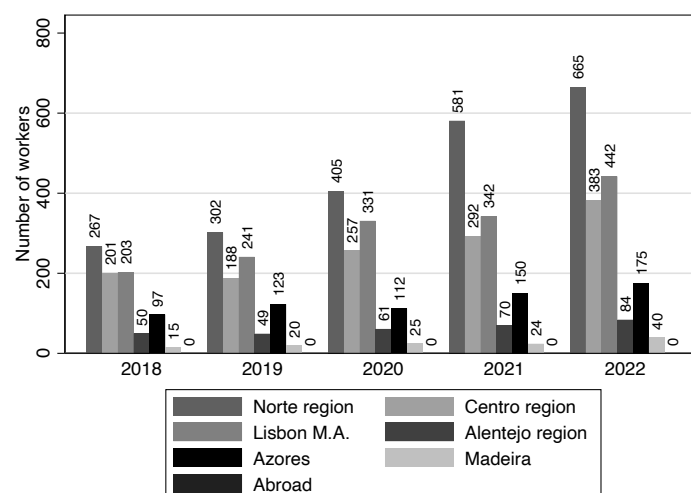
Professional category	Number of workers
Computer programmer	153
Nurse	95
Administrative technician	84

Services Director	57
Physiotherapist	56
Receptionist	47
Engineer	46
IT Analyst	42
Engineer	19

Notes: Employees with category “Residual” or “Ignorado” were excluded from these analyses. The number of workers is the number of employees TeSP graduates that work in each Professional category

Considering the regions where these graduates work, Norte and Lisbon Metropolitan Area (*Área Metropolitana, AM*) have the highest number of workers, followed by Centro, as shown in Figure 3. While these were also the three regions with the highest number of graduates, the order differs slightly. In terms of graduate distribution, Centro had more graduates than Lisbon Metropolitan Area, but in the workforce data, the order is reversed, with AM Lisboa having more workers. As noted in Section 4 of this study, the regions with the most TeSP graduates, since its implementation, are Norte and Centro, with 10,908 and 7,886 graduates, respectively. Azores had the fewest graduates over the years, specifically 43. Furthermore, the number of workers per region is significantly lower than the number of graduates, except in the Azores, suggesting that many graduates from the mainland or Madeira are moving to the Azores to work.

Figure 3: Workers with TeSP per Region by year



Notes: Lisbon M.A. represents the metropolitan area of Lisbon. The bars follow this order: Norte region; Centro

region; Lisbon M.A.; Alentejo region; Azores; Madeira; Abroad.

The average gross real salary (adjusted to 2022 prices) of TeSP graduates increased from 1,068 euros in 2018 to 1,206 euros in 2022, representing a real increase of about 13%. This increase excludes the composition of the sample, meaning that from 2018 to 2022, the workers gained experience and productivity, which partly explains the wage growth.

6. Descriptive Statistics, Model and results

Descriptive statistics can be found in Table 2. The sample used is the same as in the previous analysis, with the same restrictions (age between 18 and 38 years, and the wage higher than 80% of the minimum wage for the respective year). Most individuals are employees with either secondary school or a bachelor's degree, with low percentage of workers being TeSP graduates. In terms of wages, TeSP graduates earn less than bachelor's degree holders but more than those with only secondary school education. The gender wage gap is evident across all categories, with men earning more than women.

In terms of work positions, it is notable that 27% of TeSP graduates hold senior or middle management positions within their companies. While this percentage is lower than for bachelor's degree holders, it is, on average, significantly higher than for those with only a secondary school education. This could indicate higher returns for TeSP graduates, as management positions typically come with higher earnings. Regarding contract types, only half of TeSP graduates have an open-ended contract, a rate like that of secondary school graduates, but still below bachelor graduates.

Table 2: Descriptive Statistics – Pooled QP analysis (2018 – 2022) by highest schooling attainment

Variables	Secondary School	TeSP	Bachelor	VET
				Secondary School

# of individuals	2,061,284	6,359	1,185,675	494,706
% of the sample	38.48	0.12	22.14	9.24
Women (%)	45.14	49.74	60.47	40.17
Wage (€, mean, 2022 real prices)	1036.25	1162.86	1539.58	1046.89
Wage -Women (€)	925.65	1054.17	1401.76	922.42
Wage – Men (€)	1127.26	1270.43	1750.38	1130.44
Work position (%)				
Senior management	1.42	11.70	25.49	1.59
Middle management	2.78	15.30	18.84	3.68
Crew chiefs	3.31	4.26	7.13	3.10
Highly qual. prof.	8.89	17.58	15.58	9.21
Qualified prof.	43.07	35.40	24.17	41.96
Semi-qualified prof.	24.00	9.56	5.83	23.22
Non-qualified prof.	11.35	2.88	1.29	11.34
Interns	5.18	3.32	1.67	5.90
Region (%)				
Norte	36.75	34.91	34.25	37.95
Algarve	5.52	2.58	4.00	6.13
Centro	20.26	20.77	17.37	21.39
Lisboa	27.29	24.52	36.08	23.26
Alentejo	5.62	4.94	4.55	5.06
Açores	2.11	10.33	1.65	3.45
Madeira	2.42	1.95	2.06	2.74
Estrangeiro	0.03	0.00	0.04	0.02
Contract type (%)				
Open-ended	54.40	53.58	67.31	56.79
Fixed term	35.76	39.71	26.07	35.14
Uncertain term	9.35	5.58	5.98	7.60
Other Situation	0.49	1.13	0.64	0.48

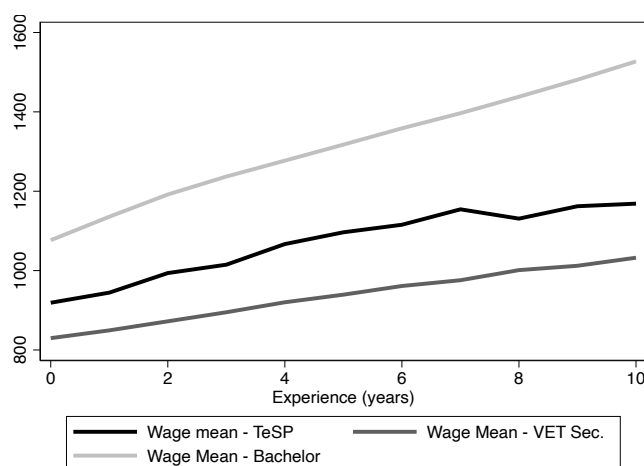
Notes: Descriptive statistics are divided for graduates of Secondary School (including regular and VET), TeSP graduates, Bachelor graduates, and VET Secondary graduates. Wage was converted for 2022 real prices. Wage – Women / Men are the means of the wage for both sexes. Work position represents the distribution of graduates, in percentage, by categories. Region represents the distribution of graduates, in percentage, by region of the firm, and contract type is the distribution in percentage per type of contract.

An analysis was conducted to examine the differences in returns among TeSP, Bachelor, and Secondary School graduates. First, an experience variable was created by subtracting the number of school years attended and six (the typical age of school entry) from the employee's

age. Using this variable, the average gross real wage (adjusted to 2022 prices) for workers was calculated for each level of experience. This average wage was then plotted against years of experience to visualize the relationship between wages and work experience for the three educational groups.

The results, as illustrated in Figure 4, show that TeSP graduates earn slightly higher salaries than secondary school graduates (both academic and vocational) with comparable levels of experience. Both groups experience modest wage growth as their years of experience increase. However, a clear contrast emerges when comparing TeSP graduates to employees with a bachelor's degree. TeSP graduates earn significantly less than their bachelor counterparts, and this wage gap becomes more pronounced with additional years of experience, particularly after six years of experience. The widening disparity is driven by the substantial wage increases observed for employees with a bachelor's degree as their experience grows.

Figure 4: Mean workers real gross wage according to experience, pooled 2017-2022 analysis



Notes: This graph illustrates how gross real wages (adjusted to 2022 real prices) evolve with years of experience among graduates from TeSP programs, vocational secondary education, and bachelor's degree courses. It considers all the workers (graduated from these three types of degree) present in *Quadros de Pessoal* from 2017 to 2022, with less than ten years of experience. Experience is computed as the age minus the number of years of schooling minus six (expected age when entering school)

Then, a model with following equation being the most extensive specification is considered:

$$\begin{aligned} \log_wage_i = & \beta_0 + \beta_1 female_i + \beta_2 age_i + \beta_3 age_i^2 + \beta_4 academic_sec_i + \beta_5 VET_sec_i \\ & + \beta_6 tesp_i + \beta_7 bachelor_i + \beta_8 full_time_i + \beta_9 \alpha_i + \beta_{10} \gamma_i + \varepsilon_i \end{aligned} \quad (1)$$

The dependent variable is the logarithm of the total hourly wage of the worker (considering normal plus extra working hours), and the independent variables are: *female* is a binary variable equal to 1 if the individual is a female and 0 if male, *age* is the age of the worker and *age*² corresponds to its square, *academic_sec* is a binary variable equal to 1 if the individual is an academic secondary school graduate (highest schooling level), *VET_sec* is a binary variable equal to 1 if the individual is a professional secondary school graduate, *tesp* is a binary variable equal to 1 if the individual is a TeSP graduate, and *bachelor* is a binary variable equal to 1 if the individual is a bachelor graduate (*licenciado*). *Full time* is a dummy that represent if the worker works or not at full time. Finally, α , a set of dummies for each year of the sample, and γ , a set of dummies for each region of the establishment were added to the regressions. The coefficient of *tesp* is the wage premium of workers TeSP graduates when compared with other degree graduates (secondary school or bachelor). Comparison group are the workers with less than secondary school as habilitation, in 2022 and in Lisbon Metropolitan Area.

Firm Fixed Effects (FE) were also included in the regressions in the last two columns of the table. Since each worker selects his job based on personal preferences rather than random assignment, failing to introduce these fixed effects could lead to biased results due to unobserved heterogeneity. Unobservable characteristics that are specific to a firm and do not change over time could influence the results, potentially skewing the estimates. By including firm fixed effects, these unobserved factors are being controlled, ensuring a more accurate analysis of the wage and job position outcomes.

Results from OLS can be found in Table 3. Column 4 results show that the coefficient of TeSP is higher when compared to secondary education coefficients and lower when comparing to bachelor coefficient. TeSP graduates see an increase in the wage per hour of 26% (because the model is a log-level one, the exact percentual variation is calculated as $e^{\beta} - 1$). Bachelor graduates see an increase in the wage per hour of 59.5% whereas for VET secondary graduates the increase is just 13.8%. Having a TeSP diploma increases the hourly wage more 12.2% comparing to a VET secondary diploma, but less 33.5% than a bachelor's. With the inclusion of firm fixed effects in column 6, the TeSP coefficient lowers to 14.3% but still higher than the VET Secondary (4.5%) and lower than the Bachelor ones (31.5%). However, the difference between TeSP and VET secondary is much lower than the difference between Bachelor and TeSP degrees. This suggests that overall TeSP graduates earn more than comparable secondary school graduates, but significantly less than workers with a bachelor. The wages effects are higher for males than for females who complete TeSP courses. The gender gap is evident, with women earning 8.5% less per hour than men, as shown in the most extensive specification of the analysis (column 6), and the wage increases with the age of the worker, with no diminishing returns as the age square coefficient is positive. The coefficients for the years are negative, indicating a positive evolution in wages between 2018 and 2022. Regarding regions, when firm fixed effects are considered, the Norte and Azores regions show wages above the average, while Algarve, Centro, Alentejo, and Madeira have lower wages (comparison group is workers in Lisbon Metropolitan Area). As expected, full-time employment is also associated with higher wages.

Table 3: Wage premiums between different graduates, 2018-2022

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Log(wage per hour)					
Academic	0.106	0.104	0.103	0.100	0.042	0.042
Secondary	(0.001)***	(0.001)***	(0.000)***	(0.001)***	(0.001)***	(0.000)***

VET Secondary	0.133 (0.001)***	0.130 (0.001)***	0.132 (0.001)***	0.129 (0.001)***	0.044 (0.003)***	0.044 (0.001)***
TeSP	0.240 (0.006)***	0.232 (0.006)***	0.240 (0.006)***	0.231 (0.006)***	0.134 (0.006)***	0.134 (0.005)***
Bachelor	0.477 (0.001)***	0.476 (0.001)***	0.470 (0.001)***	0.467 (0.001)***	0.274 (0.006)***	0.274 (0.001)***
Female	-0.145 (0.000)***	-0.142 (0.000)***	-0.143 (0.000)***	-0.142 (0.000)***	-0.082 (0.002)***	-0.082 (0.000)***
Age	0.009 (0.000)***	0.007 (0.000)***	0.007 (0.000)***	0.006 (0.000)***	0.004 (0.001)***	0.004 (0.000)***
Age ²	0.008 (0.001)***	0.010 (0.001)***	0.010 (0.001)***	0.012 (0.001)***	0.014 (0.002)***	0.014 (0.001)***
Full Time		0.195 (0.002)***	0.200 (0.002)***	0.201 (0.002)***	0.249 (0.018)***	0.249 (0.002)***
2018		-0.064 (0.000)***		-0.065 (0.000)***	-0.055 (0.002)***	-0.055 (0.000)***
2019		-0.032 (0.000)***		-0.033 (0.000)***	-0.027 (0.002)***	-0.027 (0.000)***
2020		-0.002 (0.000)***		-0.002 (0.000)***	0.001 (0.001)	0.001 (0.000)**
2021		0.019 (0.000)***		0.019 (0.000)***	0.021 (0.001)***	0.021 (0.000)***
Norte			-0.065 (0.001)***	-0.066 (0.001)***	0.005 (0.004)	0.005 (0.001)***
Algarve			-0.058 (0.001)***	-0.056 (0.001)***	-0.010 (0.009)	-0.010 (0.001)***
Centro			-0.068 (0.001)***	-0.069 (0.001)***	-0.000 (0.004)	-0.000 (0.001)
Alentejo			-0.067 (0.001)***	-0.067 (0.001)***	-0.012 (0.009)	-0.012 (0.001)***
Azores			-0.059 (0.001)***	-0.058 (0.001)***	0.014 (0.008)	0.014 (0.002)***
Madeira			-0.028 (0.001)***	-0.028 (0.001)***	-0.007 (0.008)	-0.007 (0.002)***
Abroad			0.171 (0.011)***	0.176 (0.011)***	-0.046 (0.058)	-0.046 (0.012)***
Constant	6.496 (0.006)***	6.342 (0.006)***	6.371 (0.006)***	6.403 (0.006)***	6.413 (0.024)***	6.413 (0.005)***
<i>Firm FE</i>	No	No	No	No	Yes	Yes

<i>Cluster SE Error</i>	id	id	id	id	Firm	id
<i>N</i>	4,919,745	4,919,745	4,919,745	4,919,745	4,874,366	4,874,366
<i>R</i> ²	0.290	0.299	0.299	0.305	0.614	0.614

Notes: The sample is restricted to workers that are either Academic Secondary, VET Secondary, TeSP or Bachelor graduates and for the five years between 2018 to 2022. The sample was also restricted to individuals with less than 38 years of age, and to workers with a base salary of 80% or more of the minimum wage in Portugal for each year. Comparison group are workers with less than secondary school habilitations. Age² was divided by 100 so there would be more decimal places to analyze the results. Numerical variables represent the years dummies. 2022 dummy and Lisbon M.A. dummy are omitted due to multicollinearity. Region dummies follow Nuts II regions. Company Fixed Effects are introduced on the last two columns, Standard errors (clustered at the id and Firm level) in parentheses. Significance levels: * 10%, ** 5%, *** 1%.

It is important to note that there can be some potential sample selection due to the lower percentage of TeSP graduates (with respect to total graduates) in the *Quadros de Pessoal* dataset. This underrepresentation is due to the relatively recent introduction of the TeSP courses and the possibility that some graduates continue studying or work in informal sectors. As a result, the analysis might reflect a subset of TeSP graduates who are more likely to be employed in formal sectors, leading to not so robust results.

7. Matching between work field and study area

As previously observed, TeSP graduates earn, on average, more than potentially comparable VET secondary graduates but less than bachelor graduates. However, it is equally important to analyze if these graduates are employed in jobs aligned with their fields of study. This alignment is often associated with better productivity as well as more satisfaction towards the job. Matching between occupation and qualifications ensures that the investment in education yields higher returns and reduces job dissatisfaction and turnover. To investigate this, a matching analysis between the occupation field and study area was conducted, for both TeSP and bachelor graduates. This is an horizontal matching, as it makes a correspondence between working in an area related or not with the field of study, but not necessarily in a position that implies a higher or lower qualification level.

To perform this matching, we considered the the CNAEF (“*Classificação Nacional das Áreas de Educação e Formação*”) study area. This is a classification of education and training areas

that is based on the training content of each program. It is structured hierarchically: the first digit represents broad groups, the first two digits indicate specific fields of study, and three digits denote detailed fields of education and training. For this analysis, the 2-digit field of studies is used. In total, there are 26 different fields of studies, but only 23 of them apply to TeSP and bachelor's courses.

Regarding the work area, the Portuguese Classification of Occupations, CCP (*Classificação Portuguesa das Profissões*) was used. This classification, developed by the National Institute of Statistics (INE⁸), is a structured system for categorizing professions in Portugal. Based on the International Standard Classification of Occupations 2008 (ISCO-08), it organizes professions into hierarchical groups to facilitate statistical observation, analysis, and comparison at both national and international levels. It is divided by 2-, 3- or 4-digits codes. On this case, the 4 digits codes were considered.

To establish correspondence between CNAEF codes and CPP codes, the document “*Sistema de Antecipação de Necessidades de Qualificação*”⁹ was used. This was the only source available and reliable we could find for the matching. However, it provided data for only 100 out of the 444 CPP codes, mainly for professions that require VET secondary as it's the target of the document. As a result, the horizontal matching focused exclusively on a subset of workers whose professions are aligned with these 100 codes. It is also important to state that, with this matching, a CPP can correspond to one, two or three different CNAEF areas. Workers that had “Unknown” as their field of studies were also not considered in this analysis. The final sample consisted in 2,036 TeSP and 185,055 bachelor graduates (32% and 15.6% of the initial restricted sample, respectively). Even if this sample is significantly lower than the initial one, it is important to note that this is an original and significative analysis.

⁸ Instituto Nacional de Estatística

⁹ This document was issued by Agência Nacional para a Qualificação e o Ensino Profissional, IP

Results show that among TeSP graduates, 56% work in the area of their field of studies, that is, their occupation code (CPP) matches their field of study code (CNAEF) just as in the document considered. For bachelor graduates, this percentage was 46%. This suggests that TeSP graduates have a higher probability of working in their study area. However, it is important to note that the small sample size might induce not so robust results, which could influence the results. Differences in the matching by CNAEF area can be found in Table 4. It is visible for the two field of studies with more observations present (IT and Engineering), on the one hand, a matching higher than the mean, and, on the other hand, an average wage also above the mean. A larger sample size would likely yield more robust and reliable results.

Table 4: Matching between study and work area by study area and wages for TeSP graduates

CNAEF area	Matching (%)	Average wage (€)	N° of workers
Health	86,86	995.90	236
Business sciences	78,14	1052.29	215
IT	62,76	1433.21	427
Engineering	59,86	1314.35	436
Total	56,24	1116.71	2,036

Notes: This table presents the percentage of matched workers by area of study and the average wage for TeSP workers, in real 2022 prices, graduated from that same area. Here, only the areas with more than 200 observations were considered. The full table with all the study areas can be found in the appendix.

To analyze vertical mismatching, that is a discrepancy between level of education and requirements of the job, an indicator was also developed. There are 8 levels of qualification in the dataset and, excluding interns, practitioners and apprentices. To do this, we divided them into levels that just need secondary school qualification or levels than need a higher degree qualification. Non-qualified and semi qualified professionals are the ones that only require a secondary school level of qualifications. The others, that require more than that, are qualified and high qualified professionals, team leaders (*Encarregados, contra mestres, mestres e chefes de equipa*), middle and senior management. The indicator consisted in presenting a match if the TeSP or bachelor graduates work in levels than need a higher degree qualification. Here, the

sample was not restricted regarding CNAEF correspondences as in the horizontal matching case.

Results show that 91.21% of bachelor graduates (considering the total sample of 1,185,512 observations of bachelor graduates in *Quadros de Pessoal* from 2018 to 2022) are employed in jobs that align with their qualifications. In comparison, while the majority of TeSP graduates also work in roles that match their qualifications, the percentage is lower when compared with bachelor graduates, with just an 84.24% of match. This suggests that TeSP graduates are less likely than bachelor graduates to secure positions that require higher-level qualifications.

8. Conclusions

In summary, TeSP graduates face limited direct access to the market, with only 15.4% of all the 26,391 TeSP graduates between 2016 and 2023 appearing in the *Quadros de Pessoal* database as TeSP graduates between 2018 and 2022. This suggests that self-employment, civil service or emigration may be a common career path for these graduates. Among the 4,051 TeSP graduate workers in my sample, 276 were identified as appearing as TeSP graduate at least one year and later appearing as a Bachelor graduate.

In terms of wage returns, TeSP graduates earn a wage premium of 14.34%, when compared to workers with less than secondary education. This is higher than the premium for VET secondary graduates (4.5%), but significantly lower than for bachelor's degree holders (31.52%). Over time, the wage gap between TeSP and bachelor's graduates widens, suggesting that pursuing a bachelor's degree provides better long-term financial returns. This may explain why many TeSP graduates continue their higher education.

Although the sample size was small due to various constraints, the findings indicate that both TeSP and bachelor's graduates have a similar alignment between their fields of study and work

areas. Regarding higher-level positions, while TeSP graduates are less likely than bachelor's degree holders to occupy these roles, the majority of them still hold jobs that match their higher education qualifications.

The study contributes to add more to the literature on TeSP courses, which had not been studied quantitatively before. From a policy perspective, these courses are important to serve as a bridge between secondary education (mainly vocational pathways) and higher education degrees. The literature for Vocational Secondary Education shows that initially vocational graduates earn more than those with general education, underscoring the smoother transition from school to labor market of this courses (Oliveira 2014). However, over time, there is a gap between regular and vocational education graduates, indicating that vocational education graduates generally earn less than their peers with academic secondary education on the long run (Hartog, Raposo, and Reis 2022). Here, for TeSP courses, we noted that few graduates are employed in companies, despite the courses' primary goal of establishing close connections with regional employers to meet local workforce demands. Instead, these courses often serve as a gateway to further higher education, such as bachelor's degrees, which offer greater wage returns in the long run.

The main limitation of this study was the small sample of TeSP graduates found in *Quadros de Pessoal* dataset, mainly because of the recent and small dimensioned type of courses as well as several students not having an employment contract. In the future, as more years of data become available following the implementation of these courses, a more comprehensive analysis of whether graduates pursue further higher education would be valuable. Additionally, the emergence of a complete data source linking CNAEF areas to CPP codes could enable a more detailed examination of the alignment between fields of study and work areas, expanding the analysis to a larger sample. It would also be important to explore the potential self-employment trends among TeSP graduates in future research.

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A. Appendix

Table A.1: Number of TeSP graduates per region (NUTS II)

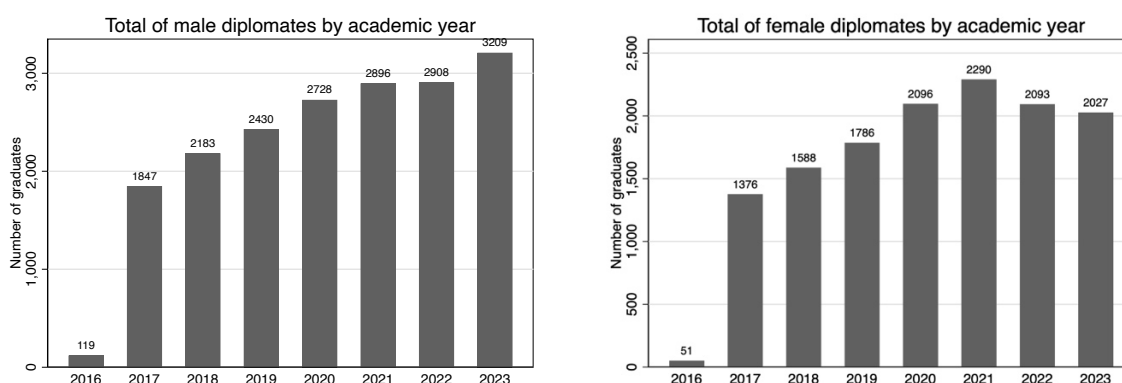
Region	Azores	Algarve	Madeira	Norte	Centro	Alentejo	Lisbon M. A
Number of graduates	59	587	783	12999	9229	2965	5005

Table A.2: Previous type of Secondary School for TeSP students

	Freq.	Percent.
Regular Secondary	1,061	23.99
VET Secondary	3,361	76.01
Total	4,422	100

Note: Data from *OTES Pos Secundário* dataset. Years considered are 2017-2020.

Figure A.1: Total of TeSP diplomates by sex



Notes: These graphs show the number of male and female graduates from TeSP courses between 2015/16 and 2022/23 academic years

Table A.3: Number of TeSP graduates per Establishment

Establishment	Total no. of graduates
Escola Superior de Saúde Norte da Cruz Vermelha Portuguesa	5
Escola Superior de Artes e Design	6
Escola Superior de Saúde Jean Piaget de Vila Nova de Gaia	7
Instituto Português de Administração de Marketing de Lisboa	7
Instituto Politécnico Jean Piaget do Norte	8
Instituto Português de Administração de Marketing do Porto	15
Instituto Superior Politécnico do Oeste	15
Escola Superior de Saúde Ribeiro Sanches	17

Escola Superior de Educadores de Infância Maria Ulrich	19
Escola Superior de Educação Jean Piaget de Arcozelo	20
Instituto Superior D. Dinis	25
Escola Superior de Enfermagem de S. José de Cluny	28
Instituto Superior de Tecnologias Avançadas do Porto	29
Instituto Superior de Paços de Brandão	36
Instituto Superior de Ciências da Administração	39
Universidade Fernando Pessoa	40
Escola Superior de Educação Jean Piaget de Almada	41
ISLA - Instituto Superior de Gestão e Administração de Leiria	47
Escola Superior de Saúde da Fundação "Fernando Pessoa"	50
Escola Superior de Educação Almeida Garrett	51
Instituto Superior de Comunicação Empresarial	54
Escola Superior de Saúde de Santa Maria	59
Universidade dos Açores	59
Escola Superior de Saúde Egas Moniz	62
Instituto Superior de Tecnologias Avançadas de Lisboa (Porto)	67
Instituto Superior de Entre Douro e Vouga	67
Instituto Superior de Ciências Educativas	79
Escola Superior de Tecnologias de Fafe	83
Escola Superior de Educação de João de Deus	84
Universidade de Trás-os-Montes e Alto Douro	92
Instituto Superior de Administração e Gestão	133
Instituto Politécnico Jean Piaget do Sul	138
Escola Superior de Educação de Fafe	138
Instituto Superior de Saúde do Alto Ave	139
Instituto Superior de Ciências Educativas do Douro	157
Instituto Superior de Novas Profissões	162
Escola Superior Náutica Infante D. Henrique	189
CESPU-Instituto Politécnico de Saúde do Norte	198
Instituto Superior de Ciências da Informação e da Administração	224
Instituto Superior de Ciências Empresariais e do Turismo	244
Instituto Superior Politécnico Gaya	309
Instituto Politécnico da Lusofonia	348
ISLA - Instituto Superior de Gestão e Administração de Santarém	351
Instituto Universitário Militar	445
ISLA - Instituto Politécnico de Gestão e Tecnologia	516
Instituto Politécnico da Guarda	563
Universidade do Algarve	587
Instituto Politécnico de Portalegre	618
ISEC Lisboa - Instituto Superior de Educação e Ciências	693

Instituto Politécnico de Tomar	694
Instituto de Estudos Superiores Financeiros e Fiscais (Porto)	695
Universidade da Madeira	755
Instituto Politécnico de Castelo Branco	821
Instituto Superior de Tecnologias Avançadas de Lisboa	826
Instituto Politécnico de Santarém	987
Instituto Politécnico de Beja	1009
Instituto Politécnico de Viseu	1096
Instituto Politécnico da Maia	1114
Instituto Politécnico de Coimbra	1211
Universidade de Aveiro	1213
Instituto Politécnico de Viana do Castelo	1434
Instituto Politécnico de Setúbal	1751
Instituto Politécnico do Porto	1805
Instituto Politécnico de Bragança	2017
Instituto Politécnico do Cávado e do Ave	2853
Instituto Politécnico de Leiria	3983

Table A.4: Number of TeSP workers by sex per year

Year/Sex	Male	Male(%)	Female (No.)	Female (%)	Total (No.)
2018	411	48.13	443	51.87	854
2019	432	45.67	514	54.33	946
2020	612	50.12	609	49.88	1,221
2021	763	50.80	739	49.20	1,502
2022	977	53.27	857	46.73	1,834

Table A.5: Number of diplomates in Higher Education in Portugal per degree (2010/11 - 2021/22)

Degree	No. of diplomates
Training complement	328
CET (“Curso Especialização Tecnológica”)	14,742
TeSP course	26,274
Specialization Diploma – 3 rd cycle PhD course	14,304
Specialization Diploma – 2 nd cycle master’s course	108,590
PhD	698
PhD 3 rd cycle	21,805
Specialization after “Bacharelato”	145
Specialization after Bachelor	18,181
Bachelor	4
Bachelor – 1 st cycle	430,558
Bachelor of integrated masters	69,723
Masters	42
Masters – 2 nd cycle	176,158
Integrated masters	79,334
Terminal integrated masters	375
Total	961,261

Note: Data source is the “*Registo de Alunos Inscritos e Diplomados do Ensino Superior*” (RAIDES). Academic years considered are from 2010/11 to 2021/22.

Table A.6: Number of bachelor graduates by previous finished degree (2010/11 - 2021/22)

Previous degree	No. of graduates
Post secondary school	9,980
Secondary school	462,659
“Bacharelato” or equivalent	2,204
TeSP or equivalent	4,579
PhD or equivalent	188
Bachelor – 1 st cycle or equivalent	6,626
Bachelor or equivalent	5,663
Master’s or equivalent	1,970
Other	6,416
Total	500,285

Notes: This table represents the previous degree of students that appeared as graduated from a Bachelor, Bachelor – 1st cycle of bachelor of integrated masters in the table A.6. Data source is the “*Registo de Alunos Inscritos e Diplomados do Ensino Superior*” (RAIDES). Academic years considered are from 2010/11 to 2021/22.

Table A.7: Matching between study and work area by study area and wages

CNAEF area	Matching (%)	Average wage (€)	N
Education & Teachers training	0	1521.38	39
Arts	54.55	1078.25	165
Humanities	0	1129.03	48
Social & Behavioral sciences	0	986.52	86
Information & Journalism	0	1165.19	4
Business sciences	78.14	1052.29	215
Law	30.77	1173.44	13
Life sciences	0	956.50	53
Physics	0	932.96	20
Maths & Statistics	0	901.73	3
IT	62.76	1433.21	427
Engineering	59.86	1314.35	436
Manufacturing industries	46	1247.11	50
Architecture & construction	61.02	1115.05	59
Agriculture	73.17	1132.11	41
Veterinary sciences	0	1511.64	3
Health	86.86	995.90	236
Social services	51.28	962.73	78
Personal services	47.83	1035.05	23
Transport services	0	819.68	2
Environmental protection	15.38	1146.88	13
Security services	31.82	956.57	22
Mean / Total	56,24	1116.71	2,036

Notes: This table represents the matching percentage between the CNAEF area and the CPP code and the average real gross wage (in terms of 2022 prices) for all the 14 CNAEF areas of study.