

## Policy recommendations for improving academic achievement among IPLeiria student-workers

---

**Ana Sofia Lopes and Pedro Carreira,**

School of Technology and Management, Leiria Polytechnic Institute  
CARME (Centre of Applied Research in Management and Economics), Leiria Polytechnic Institute

### **Abstract**

*In Portugal, student-workers represent 8.5% of higher-education students and observe higher dropout rates, partially because of a higher education system that is more fitted to the traditional students.*

*Using an extensive longitudinal database with original information on individual, degree and employment characteristics of 1566 undergraduate student-workers from IPLeiria, we determine the factors that drive the dropout and graduation risks of adult workers in higher education.*

*We concluded that academic failure explains only a fraction of dropout behaviour among adult student-workers. Indeed, academic achievement is also affected by school-residence distance, financial difficulties, marital status, motivation, field of study, academic integration and professional background.*

*We found that men are more likely to drop out and more influenced by employment variables (self-employment, job qualification and job-degree relation) while, for women, marriage (associated with household responsibilities) seems to increase the risk of dropout.*

*Some policy recommendations are suggested for the higher education system to adapt better to the particular characteristics of adult workers, namely by: adjusting the schedule and composition of classes; appreciating the curriculum and orienting candidates, stopouts and poor performance students; providing scholarships; distributing the vacancies across admission regimes; and introducing shorter/simplified versions of the degrees.*

*Keywords: education policy, IPLeiria, student-workers, dropout, employment variables.*

---

### **1. Introduction**

As it is claimed by human capital theory (pioneered by Becker, 1962), achieving graduation in higher education leads to important benefits both for the graduated individuals and for the economy as a whole. The skills acquired during graduation are reflected in higher labour productivities, increasing the competitiveness of firms and allowing higher wages. For example, in Portugal, and according to OECD (2016), the average wage of a full-time worker with higher education is 68% higher than the average wage of a worker with the upper secondary level. Moreover, the employment rate is also higher for higher education graduates, as well as the chance of being successful entrepreneurs and their self-fulfilment perception.

Despite its importance, higher education may contribute to increase socioeconomic inequalities, as students with a more favourable socioeconomic background are more likely to enrol. Indeed, while 29% of the parents of higher education students attained the higher education level themselves in 2010 (Costa & Duarte, 2012), the percentage of population between 40 and 64 years-old with a higher education diploma was only of 10% in that year (INE, Census, 2011). Adult education can however weaken this effect and play an important role in social mobility, as it allows people coming from disadvantageous backgrounds to have a new opportunity to enrol in higher education. For example, in the case of adult workers of Leiria Polytechnic Institute (IPLeiria) in 2009, 56% of their parents have at most 4 years of schooling, whereas this percentage is only of 19% for the remaining students.

In order for adult education to reduce socioeconomic inequalities and contribute to social mobility in an effective way, it is necessary not only to promote the participation of adult workers in higher education but also to create conditions for them to be able to complete their degree. In one hand, policy makers often encourage non-traditional students to enrol in higher education, “partly because of the emphasis on lifelong learning, but on the other hand they do not seem to be concerned about understanding their needs and circumstances, thereby maintaining an institutional system designed for a very different type of student” (Gilardi & Guglielmetti, 2011). This paradoxical situation justifies the need of having studies focusing on understanding the factors that explain the probabilities of graduation, dropout and persistence of adult student-workers and on providing policy indications aimed to reduce their dropout rate and increase their graduation frequency, without reducing participation, which is the aim of this study.

Although very rich (Tinto, 1975; Bean, 1980; Murtaugh, Burns & Schuster, 1999; DesJardins, Ahlburg & McCall, 1999; Ishitani, 2003; Johnes & McNabb, 2004; Gilardi & Guglielmetti, 2011; Arias Ortiz & Dehon, 2013), the literature on dropout behaviour focus essentially on traditional (young and non-worker) students. However, adult student-workers are very distinct from traditional students. They have less available time to dedicate to school due to professional duties and higher family responsibilities (as they are older, parents and married more often). In addition, their motivations to enrol in higher education are very heterogeneous, varying from simple self-satisfaction to goals related with progression within their current professional career or with pursuing a new (more rewarding) career. Therefore, the typical determinants of dropout and graduation risks may have particular effects or magnitudes for adult student-workers that don't fit in the pattern of young students, making the structural stability of pooled models (i.e. that include all students) a remote possibility and justifying adult workers to receive a separate treatment. This constitutes the first contribute of our paper.

A second particularity of our study relies on the extensive and unique database with longitudinal information on 1566 student-workers from a Portuguese higher-education institution (IPLeiria) that was constructed by the authors by matching

five different sources. Besides the usual covariates considered in the literature, the database contains detailed information on the characteristics of the degrees and it includes several new employment variables that may be key determinants of graduation and dropout risks and, consequently, important in a policy perspective.

The structure of the paper is as follows. In section 2, we describe the construction of the dataset and its variables and present the modelling strategy. The results are exhibited and discussed in section 3 and, finally, the main conclusions and policy implications are drawn in section 4.

## 2. Data and Model

This study uses longitudinal data on the 1566 individuals that enrolled, as student-workers, in an undergraduate degree of IPELeiria, in the academic year of 2008/09 or 2009/10, which represents around 6% of all student-workers that enrolled in undergraduate degrees in Portugal those years. We follow these students until the academic year of 2016/17, observing if and when a certain student-worker was able to achieve graduation, if he/she interrupted the studies in a permanent basis (dropouts), or if he/she is still persisting, which resulted in a person-period dataset with a total of 4317 observations.

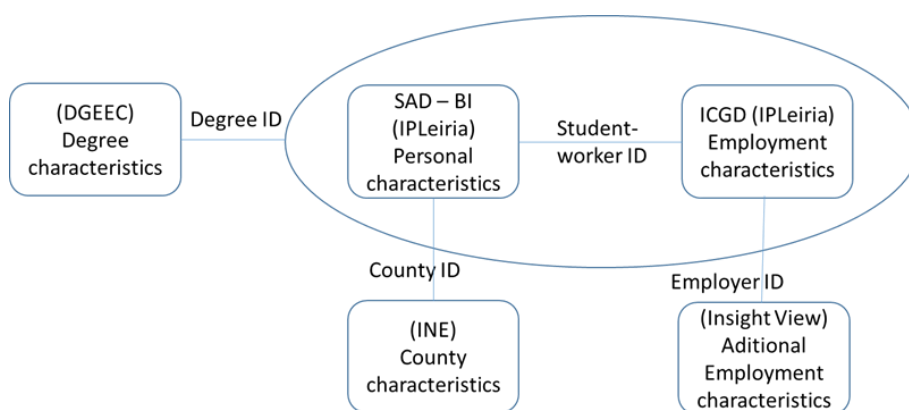


Figure 1: Database composition

The database was built by crossing data from several sources and by adding some constructed variables (Figure 1). First, as students are traceable by an identification number, we joined in a single database the nine annual databases of *Sistemas de Apoio à Decisão - Business Intelligence (SAD-BI)*, from IPELeiria, mainly containing personal and background information. Second, again using a common identification number, we match the database with *Inquérito Caixa Geral de Depósitos (ICGD)*, which provides information on employment variables. Third, as the employer's name is identified in ICGD database, we used the Iberinform *Insight View* online platform to extract information on the legal size and business

sector of the employer organizations. Next, it was added longitudinal information at the degree level from the databases of *DGEEC – Direção-Geral de Estatística da Educação e Ciência* (Ministry of Education and Science, Portugal). Finally, socioeconomic information of the residence county of students was obtained through *Instituto Nacional de Estatística (INE)*.

The database was reorganised afterwards “to construct a person-period dataset which includes a record for each time period in which the individual is at risk” of an event (DesJardins *et al.*, 1999).

The definition of dropout is of a student that interrupts his/her studies permanently. However, as the observation period is finite, such definition is not implementable, leading most research to consider dropouts as the cases when students interrupt their studies without returning to school within a sufficiently larger time interval (usually of two years or more). In the present paper, this last definition is also adopted, with a required interruption period of three academic years. Given that dropout behaviour can occur at most in year 5 for the students observed during eight years, the database is restricted to its first five years, implying a reduction of 128 person-period observations, but assuring that all events of interest are observed in any time period in an unbiased way. According to Heublein (2014), the timing must be chosen “in such a way that” in the last year “the share of students that are still in higher education is not greater than 20%” of the initial students in the dataset, which is verified in our case, as year 5 contains less than 15% of the initial individuals.

In the modelling strategy, as Scott & Kennedy (2005) and Arias Ortiz & Dehon (2013), we use the multinomial logistic regression for individual  $i$  ( $i=1,\dots,1566$ ) of event  $k$  ( $k=1,2$ , with 1 standing for graduations and 2 for dropouts) at time  $t$  ( $t=1,\dots,5$ ):

$$\log \left[ \frac{h_i(k,t)}{h_i(0,t)} \right] = (\alpha_{k1}D_{i1} + \dots + \alpha_{k5}D_{i5}) + (\beta_k X_{it} + \gamma_k Z_{it} + \delta_k W_{it}),$$

where the ratio  $h_i(k,t)/h_i(0,t)$ , usually referred as the outcome-specific hazard ratio, measures the risk of experiencing event  $k$  relatively to the risk of observing no event ( $h_i(0,t)$  is the hazard of the non-event defined as  $1 - \sum_{j=1}^2 h_i(j,t)$ , the reference category in our multinomial logit model).  $D_{i1}, \dots, D_{i5}$  are time period dummy variables identifying each year ( $D_{i1}=1$  if the observation for individual  $i$  comes from the first year of enrollment, and  $D_{i1} = 0$  if it comes from any subsequent year) and the intercept parameters  $\alpha_{k1}, \dots, \alpha_{k5}$  capture the hazard probabilities when the value of all covariates is zero in each year.  $X_{it}$ ,  $Z_{it}$  and  $W_{it}$  are the vectors of individual, degree and employment covariates, respectively (including both constant and time-varying variables) and the vectors of parameters  $\beta_k$ ,  $\gamma_k$  and  $\delta_k$  measure the effects of the covariates on the baseline hazard function, on a logit scale.

### 3. Findings

The multinomial logit model was estimated under maximum likelihood using Stata and Gretl. The fitted model predicts correctly 74% of the true events, corresponding to a statistically significant McFadden R<sup>2</sup> of 32.5% (log-likelihood ratio = 1901.48, p-value = 0.000).

The results are presented in Table 1. Each estimated coefficient is to be interpreted as follows: when its associated covariate increases by one unit (while holding everything else constant), the outcome-specific hazard ratio is multiplied by the exponential of the coefficient (Arias Ortiz & Dehon, 2013).

Table 1: Multinomial Logit, 4189 observations

<i>Variable</i>	<i>Graduation (1)</i>	<i>Dropout (2)</i>
Constant	-2.8836	-4.6070 *
Male	-0.2614	0.7827 ***
Married male	0.3515 **	-0.0914
Married female	0.3939 **	0.3248 *
Foreign	0.2508	-0.1558
Scholarship	0.6613 ***	-0.8187 **
School-residence distance	0.0017 **	0.0012 *
Residence county schooling level	0.1642	-0.0028
Residence county purchasing power	-0.0041	0.0036
First call admission	-0.0539	-0.0725
First option	0.4120 *	-0.4776 **
Part-time status	-0.3724	0.2160
Retention years	-0.9603 ***	1.0784 ***
Stopout	-1.2961 ***	0.9340 ***
Daytime Schedule	0.3303	-0.6290 **
E-Learning	0.0491	-0.2055
Arts	1.1306 ***	0.1534
Education	0.7744 *	-0.0454
Health	1.2470 ***	-0.3566
Information Technologies	0.8968	-0.8431
Engineering	-0.0483	-0.6241 **
Services	0.0142	-0.0133
Degree total number of students	-0.0010	-0.0003
Degree % same gender	0.7358 **	0.5802 **
Degree % student-workers	1.2138	-2.1893 ***
Degree % part-time students	-0.3141	-0.2827
Degree % scholarships	-0.9136	0.7581
Degree % foreign students	-2.9808	-5.1361
Degree average final GPA	-0.0450	0.1149
Degree final GPA standard deviation	2.0543 ***	-1.2391 ***
Degree average age	0.0102	0.0794 *
Degree age standard deviation	-0.0356	-0.0272
Manufacturing	0.2548	-0.4437

Construction	0.3310	-0.4962
Wholesale and retail trade	0.4314	-0.1252
Public administration	0.3972	-0.5244 *
Other services	0.0021	-0.4969
Education	0.0267	-0.6976 *
Health	0.0836	-0.9887 **
Accommodation and food services	-0.0774	-0.7943 **
Micro size	0.2066	0.0805
Medium size	0.4996 **	-0.1632
Large size	0.2754	0.1579
Self-employed (male)	0.7387 **	0.2325
Self-employed (female)	-0.2694	0.0271
Qualified job (male)	0.0563	-0.3699 ***
Qualified job (female)	0.0822	-0.0213
Unrelated job (male)	0.0814	-0.2514 *
Unrelated job (female)	-0,1534	-0,0443

\*p-value<0.1, \*\*p-value<0.05, \*\*\*p-value<0.01

Female student-workers have a small probability of dropping out than males. Married student-workers have a higher chance of graduation than single students, and, in case of females, they also have a higher probability of dropping out.

Probably due to higher time and financial costs, students that are far from home are less persistent (having higher probability of graduating and dropping out). Moreover, none of the variables that describe the socioeconomic context of the student at the residence county level were found to be influent for the probability of either concluding the degree or dropping out.

The attribution of scholarships might be used as a tool to promote the academic achievement of students, as it decreases the probability of dropping out and increases the probability of graduation. A similar result is obtained when students enrol in their most preferred degree (first option), which is associated with a higher motivation.

Students with more retention years and with stopout have a lower graduation hazard and a higher dropout risk. Expectedly, the lack of academic progression may either postpone an eventual graduation to the outside the observation period or lead to a permanent interruption due to decreased motivation. In its hand, part-time status seems not to be influent, even though it is a policy instrument essentially devoted to increase participation and decrease dropout rates.

Among degree characteristics, we first notice that student-workers enrolled in degrees with a daytime schedule observe a lower risk of dropping out than those attending classes in a post-work time schedule or enrolled in an e-learning degree, which may reflect their greater availability for school and/or a higher time flexibility of their professional agenda. Second, on the field of study, students enrolled in arts, health or education seem to have a higher risk of graduating than students enrolled in social sciences and law, while engineering students appear less likely to drop out.

Third, enrolling in degrees with higher proportions of student-workers seems to decrease the probability of dropping out, which signals the importance of academic integration. Next, a higher percentage of students of the same gender may increase both the hazard of graduation and of dropout. In addition, a higher dispersion of final GPA within the degree (i.e. higher heterogeneity between the academic performances of the students) contributes to academic achievement. Finally, a higher average age of the students seems to increase the probability of dropping out.

Students employed in health, accommodation and food services, education and public administration sectors have reduced dropout intensity. Also, working in a medium size organization may contribute to increase the hazard of graduation.

In case of male student-workers, being self-employed or/and exercising a qualified job contributes positively for academic achievement. The former contributed to increase the hazard of graduating and the latter to decrease the probability of dropping out. Also for males, enrolling in a degree which field of study is not related at all with their professional field seems to decrease the risk of dropping out.

In order to study the effects of the different admission regimes over time, all the associated variables were included in our model considering their interactions with time. These particular results were omitted in Table 1 for space reasons but are discussed next.

We find that students that have already been in higher education institutions have a higher probability of graduating in their first years of enrolment, as compared to the baseline M23 regime. This is the case of readmissions, transferences, graduated, degree transition and CET students, which again reflects the fact that these students may get some credits at the enrolment moment due to previous formation. The particular case of degree transitions may signal as well that reorientation is important on a policy perspective, as it also decreases the dropout rate in the first year. The same does not occur with readmissions and admission of graduated students, as the dropout hazard ratio increases in the initial years.

Another important result is that, in general, the admission regime is only relevant in the first two years of enrolment, meaning that, after being integrated, all students perform similarly, independently of the admission regime.

#### **4. Conclusion and Policy Implications**

In this paper, we looked for the factors that can explain the propensities of adult student-workers to either graduate, drop out or persist in higher education, contributing to fulfil the gap in the existent literature on these particular case of adult workers. As the extensive longitudinal dataset, build by matching 5 different sources, has a large set of individual, degree and employment covariates, some of

them controlled by policy makers, education institutions or students themselves, we are able to offer several policy indications that can contribute to improve academic achievement among adult workers.

First, promoting reorientation (switching from one degree to another) of the students with academic failure, so that they can respond more effectively to their personal and professional expectations and motivations, seems to have its merits in both reducing the risk of dropout and increasing the likelihood of graduation. Naturally, reinforcing the orientation of candidates during the initial process of application to the higher education in order to make more adequate matches between students and degrees is also likely to contribute to their academic achievement. Additionally, even though stopping out naturally delays the conclusion of the degree, there is a high probability of graduation for students that return after an interruption (readmissions). Hence, higher education institutions may want to create communication mechanisms with stopout students, facilitating and promoting their return to school, either to the same degree (readmissions) or to a different one (reorientations).

Next, the attribution of scholarships (which aims to surpass financial limitations of students) proves to be an important incentive for students to complete their degree.

In addition, while offering post-work class schedules is important for the participation of adult student-workers in higher education, scheduling daytime classes to the students who can attend them may contribute to decrease dropout rates.

We also found that men are more likely to drop out than women and that they are, in general, more influenced by employment variables, as for example self-employment, job qualification level and job-degree relation. For women, marriage seems to increase the risk of dropout, which may reflect their traditionally higher devotion to household responsibilities.

Other interesting result is the fact that enrolling in a degree with no relation with the job decreases the probability of dropping out, in the case of men. These students are aiming for a new (more rewarding) career, rather than investing on progression or skill updating within their current professional career. According to the human capital theory pioneered by Becker (1962), they thus foresee more benefits resulting from graduation. Indeed, student-workers that enroll in related degrees may be interested solely on some hours of formation to reinforce some knowledge that is specific to their job, and not properly on completing the degree. In these cases, introducing some flexibility in the degree and offering shorter and simplified versions of the degrees can be helpful to pre-empt students from dropping out so often and lead them to achieve graduation.

On the admission regimes, beyond the previously referred, the main conclusions are that their effect on graduation and dropout hazard rates loses significance after the first two years of enrolment and that much of the significance in the first two



years is explained by the loading of some credits at the enrolment moment that occurs frequently in all admission regimes other than M23 and CNAES. This can be seen as evidence contrary to the established result that CNAES students dropout less often and graduate more frequently that supports the common practice by central education authorities of privileging them in terms of admission vacancies. For the particular case of adult student-workers, for example, M23 students seem to perform as well as CNAES students, and thus a more even distribution of vacancies across admission regimes, would be justified.

Regarding the employment variables, beyond the aforementioned, the size and business sector of the employer were also shown to be relevant, which is valuable information to be used by higher education institutions when assessing the curriculum of the candidates in the admission process (which occurs in all admission regimes except CNAES).

Finally, it was possible to observe that adult student-workers dropout less often when enrolled in degrees with higher proportions of student-workers, reflecting the importance of academic integration. When forming classes, education institutions can take this into account and make efforts to join student-workers in the same classroom and promoting GPA heterogeneity within the classroom.

## 5. References

- Arias Ortiz, E., & Dehon, C. (2013). Roads to Success in the Belgian French Community's Higher Education System: Predictors of Dropout and Degree Completion at the University? *Libre de Bruxelles. Research in Higher Education*, 54(6), 693–723. <https://doi.org/10.1007/s11162-013-9290-y>
- Bean, J. P. (1980). Dropouts and Turnover: The Synthesis and Test Of A Causal Model of Student Attrition. *Research in Higher Education*, 12(2), 155–187. <https://doi.org/10.1007/BF00976194>
- Becker, G. S. (1962). Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy*, 70(5, Part 2), 9–49. <https://doi.org/10.1086/258724>
- Costa, A., & Duarte, J. (2012). Social Mobility through Higher Education.
- DesJardins, S., Ahlburg, D., & McCall, B. (1999). An event history model of student departure. *Economics of Education Review*, 18(3), 375–390. [https://doi.org/10.1016/S0272-7757\(98\)00049-1](https://doi.org/10.1016/S0272-7757(98)00049-1)
- Gilardi, S., & Guglielmetti, C. (2011). University Life of Non-Traditional Students: Engagement Styles and Impact on Attrition. *The Journal of Higher Education*, 82(1), 33–53. <https://doi.org/10.1080/00221546.2011.11779084>
- Heublein, U. (2014). Student Drop-out from German Higher Education Institutions. *European Journal of Education*, 49(4), 497–513. <https://doi.org/10.1111/ejed.12097>
- Ishitani, T. T. (2003). A longitudinal approach to assessing attrition behavior among first-generation students: Time-Varying Effects of Pre-College Characteristics. *Research in Higher Education*, 44(4), 433–449. <https://doi.org/10.1023/A:1024284932709>
- Johnes, G., & McNabb, R. (2004). Never Give up on the Good Times: Student

- Attrition in the UK\*. *Oxford Bulletin of Economics and Statistics*, 66(1), 23–47. <https://doi.org/10.1111/j.1468-0084.2004.00068.x>
- Murtaugh, P. A., Burns, L. D., & Schuster, J. (1999). Predicting the Retention of University Students. *Research in Higher Education*, 40(3), 355–371. <https://doi.org/10.1023/A:1018755201899>
- OECD. (2016). *Portugal - Country Note - Education at a Glance: OECD indicators*. OECD Publishers.
- Scott, M. A., & Kennedy, B. B. (2005). Pitfalls in Pathways : Some Perspectives on Competing Risks Event History Analysis in Education Research. *Journal of Educational and Behavioral Statistics*, 30(4), 413–442. <https://doi.org/10.3102/10769986030004413>
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45(1), 89–125.