Doctoral Supervision at NOVA Lisbon University: An Overview

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Abstract   This paper intends to present a preliminary study focusing doctoral education in NOVA Lisbon University. This University is less than fifty years old and it is growing, but a slight decrease in the doctoral population was observed in the last years, the completion times are not the ideal and attrition exists. So it is important to know the characteristics of the doctoral population of the University, in terms of profile and main difficulties, envisaging what can be done to promote lower attrition and shorter completion time. Using a national database (RAIDES) and public institutional documents, it was possible to initiate a research that aims at characterizing not only the student population, but also the supervision practices, monitorization and evaluation.

Keywords   Doctoral Supervision, Practices, Monitoring, Evaluation

1. Introduction

At the beginning of the 21st century, higher education (Bologna, 1999) and the research area (Lisbon Strategy, 2000; Berlin 2003) emerged as two pillars of the knowledge based society. It is within this context that the interest about doctoral education emerges, being considered one of the keys for innovation and development in higher education. The implementation of the proposals that emerged from the meetings of the ministers responsible for higher education (MMHE) and of the European University Association (EUA), brought a new look to the third cycle (Dublin descriptor, 2004; Bergen framework of qualifications, 2005 www.dges.mctes.pt/.../BolognaFrameworkandSelfCe), to doctoral supervision (ten principles of Salzburg, 2005 www.eua.be/eua/jsp/en/upload/Salzburg_Report_final.112 9817011146.pdf), and to doctorate completion time, student's profile, skills, competence and mobility.

The examination of doctoral education is ongoing since its importance was recognized by society [1]. Jones established that the studies conducted between 1971 and 2012 about doctoral studies could be classified in six themes: teaching, doctoral programs, writing and research, employment and career, supervisor- student relationship and doctoral students' experience [1].

In the following section we will present a reflection about doctoral education, completion time and attrition, predictors and factors that literature shows to be related to the time to complete doctoral degree and finally we present some strategies that may be used to reduce attrition. In section 3, 4 and 5 we will present data and results from UNL and a discussion and reflection about it.

2. Doctoral Education

In the last fifty years doctoral education has been the object of research due to its impact on society as it is associated with knowledge development and innovation. Doctoral education is the most demanding processes of teaching and learning and the highpoint of educational achievement [2, 3] However, the nature of the PhD supervision remains an obscure field. Supervision implies teaching, learning and knowledge transfer, but also requires tools for the supervisor to do it ensuring the students' competence development. As Zuber-Skerritt and Ryan (1994) refer "Research postgraduate training is unique (…) in providing a direct linkage between teaching and learning activities and research", cited in Latona and Browne, 2001 [4]. It can be divided in two different periods: the schooling and integration process in the beginning (first year) and the research process. In both, students can experience lack of support (not only by the supervisor but also by peers and institution), isolation, uncomfortable with the research environment (institutional climate) but also personal difficulties (mistaken expectations, mismatch perceptions, frustration) [5, 6].

One question arises when the PhD is analyzed: the importance of the PhD is related to the new knowledge

constructed during the PhD journey or is it more important the training for being a researcher which is a process that is also developed during the PhD journey? [4, 7] Supervisors' perspectives of what knowledge production means, as well as the university agenda has also a great influence in the student´s research and on the PhD research process [8]. If the supervisor perceives the knowledge production in an academic perspective, it will develop high quality research and its role will focus on motivation and professional guidance. In this context, the true knowledge production relies on Universities that also have the function of educating graduates. If the supervisor perceives knowledge production in a market perspective, it will develop economic and viable research and its role will be focusing the production of practical results. In this perspective, the skills and competences of graduates trained at the universities are used to promote innovation and society´s well-being; additionally the universities promote economic growth and the knowledge is constructed throughout the collaboration of universities and industry or business. If the supervisor perceives knowledge production in a changing society, it will develop internationally relevant research and its role will focus on promoting the student´s ability to apprehend and reflect about applying the knowledge in new contexts [8].

Leadership during the supervision process is related to the relationship that is established between student and supervisor and the power in it. The leader-member exchange construct (with four dimensions: contribution, loyalty, affect and professional respect), which evaluates the quality of the relationship between a leader and an organizational member, were applied to the supervision and the results show a positive impact on doctoral student engagement [9]. This finding suggests that improving the supervision relationship quality implies the development of emotional intelligence, which will enable the resolution of interpersonal problems and promote the involvement of both (supervisor and student) in the research project and the successful conclusion of the doctorate.

The transition to becoming an independent research is also a fundamental part of doctoral education. The dissertation is not only the product of research, but also a sign of research maturity. Usually, writing a thesis implies loneliness and isolation, being the most difficult part for many students. Independent scholarship is part of the socialization process in doctoral education and concluding a PhD means independent scholarship and the capability of conducting a research autonomously [10- 12].

In a study that analyzed the relation between academic guidance and autonomy, the authors found that effective doctoral supervision must involve support and guidance, but also encourage the development of the students' autonomy [13]. These investigators found that higher levels of research self-efficacy were related to higher autonomy and academic support, but greater levels of personal support were indicatives of low levels of autonomy support and lower research self-efficacy.

Supervision also includes students´ socialization in the academy, with peers and with the research community. For Weidman and collaborators (2001), student socialization develops in four stages: anticipatory, formal, informal and personal. Each stage has different characteristics related to the institutional and research environment and to the integration / socialization process in the institutional culture [10, 11]. Lee and Kamler (2008) point out that low publication rate in this context are usually related to insertion problems in the research community, which reflect the quality of doctoral education [14].

2.1. Completion Times and Attrition-fitting the Mold

The literature supports the relation between supervisory practices and students' completion. Usually supervisors learn how to supervise from their own experience or by learning with other supervisors through vicarious experience [15]. So, if they had a good supervision experience, they have a good hypothesis of promoting good research supervision; however, if they experienced a poor supervision process, they need more support about how to supervise. This support can come from the institution (supervision courses), peer meetings or from the literature.

The quality of research supervision and the students' completion times and rates was examined in Australian universities. In 2001 Latona and Browne published a report entitled "Factors associated with completion of research higher degrees". In this paper, they analyze quantitative and qualitative data related to time-to-complete, attrition rates, increased enrollments, student satisfaction, innovatory practice and improved quality of programs [4]. A new study at Australian Universities, three years later, concluded that after four years of enrolment in a PhD course, 51% of the students had completed successfully the course and that after 6 years the number increased to 70% [16]. As studies referred by Bourke and collaborators indicate the PhD area has been an important factor since in arts and humanities the completion rates were 45% and in life sciences 70 % [16].

In the UK completion rates after 10 years were 51% in arts and humanities and 64 % in the sciences [16]. However, in the Netherlands the completion rate is around 75%, which is explained by the financial support given to students enrolled in the PhD [17]. The attrition rate in doctoral education in the United States varies from 40% to 70% across disciplines [11]. In his research Gardner highlights that attrition rate range from lower rates (24%) in biomedical and behavioral sciences to nearly 67% in social sciences. Several studies allow the conclusion that there is no rule, but tendencies [18]. The author mentions significant literature that indicates clues regarding the causes and consequences of doctoral attrition and the relationship between them. For instance, attrition was

related to funding, advisor relationship, gender, race, disciplines. The tendency was that higher attrition rates may occur in the humanities and social sciences, with women, students of color, as well as with students with lower funding and with students who are less socialized (less integrated with peer and faculty members) [18].

One of the reasons for the maintenance of higher attrition rates may also be related to the perceptions of their origins. In her research, Lovitts (2001) concluded that there is a mismatched view of what causes attrition between the students' perception and the faculty members and administrators. This adjustment relates to the differentiated awareness that they (students, faculty members and administrators) have about attrition and reflect different points of view about the same problem. She used the attribution theory to comprehend the results and the implications of it. If they all perceived differently the problem, they will attribute it to different causes and will propose different solutions that in the limit may have an opposite effect: instead of reducing attrition, they can prioritize it [19]. In the same context (PhD attrition), Gardner in 2009 also used attribution theory to analyze the understandings of doctoral attrition by role and by department, in departments with high and low doctoral attrition. She interviewed 34 faculty members and 60 doctoral students, and concluded that continues a mismatch between their doctoral attrition attributions. She emphasizes that, the differences between students and faculty members, in understandings the causes of doctoral student attrition can be an obstacle to improve student completion, and may explain the maintaining attrition, as Lovitts had perceived in 2001. Lovitts proposes that a dialogue between them (doctoral students and faculty members) could clarify the causes of attrition and allow its diminishing, but also could promote students higher support from the institutions and supervisor [18].

2.2. Potential Predictors and Factors Related to Timely Completion

One potential predictor also related to timely completion is the financial support/ funding; students with scholarships completed the degree in the shortest time as also students who engage in the PhD at full time [20]. The lack of support not only by the supervisor, but also by the institution and peers may also contribute to attrition [11]. Other factors that could predict the timely completion are the supervision practices and its quality, writing the dissertation from the beginning, maintaining the same topic during the PhD, frequent meetings with supervisors' and the feedback quality [20].

Gender differences were also detected in research, not only related to time to completion, but also to the quality of the supervision relationship [17, 21]. The quality of the supervisor relationship established during the doctorate differed if the supervision was conducted with a student male or female. The authors relate these findings with a traditional profile of the PhD student: young, male and developing a research in natural science [22]. In this research, it was found that PhD supervisors privileged the students with a traditional profile and relegated those who did not correspond to this profile. However, this student profile doesn´t fit well in all the researched cases, and the difference between disciplines must be taking into account [23].

So another factor associated with completion rates was the discipline area in which the PhD is developing. In natural science and based disciplines (engineering, health) time- to-complete is lower than in social sciences, arts or humanities [4, 16 and 22]. In a study in an Australian Science faculty, Jiranek (2010) concluded that the attrition rate was lower (33%) for the School of Chemistry & Physics and among male and/or international students with scholarships [22] A study focusing a research group in mathematical sciences, belonging to an Australian university, allows the identification of four perceived factors that contribute to timely completion: the research project, research environment, personal aspects, and incoming skills [24]. Personal factors and psychological attributes (procrastination, perfectionism, beliefs) can also contribute to longer time-to-completion and attrition [4, 25], as well as socialization process in a research community during the PhD [10, 11 and 26].

2.3. Strategies to Reduce Attrition and Promote Doctorate Completion

Lee, Kamler, Wellington and Lindsay consider the issue of teaching the doctoral student to write the thesis and papers as one of the attributions/obligations of supervisor that should be practiced regularly. Research about the continuous thesis-writing model highlighted that this is a knowledge-production activity that could support the PhD student in his/her journey and help students to monitor their PhD work [14, 27 and 28].

A specific strategy that can contribute to involve doctoral students in the PhD is the creation and immersion in learning environment, with activities that give a sense of competence and belonging, promote autonomy and self-efficacy [29]. In a recent paper, Beck (2016) analyzes the doctoral attrition using a self-determination theory approach and proposes strategies related to the development of autonomy, competence and affiliation to reduce student attrition [30].

The fit between the supervisors´ and the students´ perception on each one role, supervisor´s understanding of the student´s needs regarding supervision, institutional resources and the challenges of the doctoral process may also promote students´ engagement and effective supervision [31, 32]. Timely feedback is also reported as being very important for completion time, as well as frequent meetings and monitorization of the research PhD

(with explicit research milestones, which allow students and supervisor to monitor the process) [4, 17].

In a recent paper, Denicolo and Duke (2017) present some recommendations for universities, supervisors and also for doctoral students, regard to how universities better support a more diverse PhD population, reducing their attrition [33]. One of propose for universities is a continuous supervisor professional development, another is a clear course length expectations and career outcomes of doctoral programmes. For supervisors they focus the student support (attitudes, integration, and participation) and a commitment to their one professional development. For students they suggest a real engagement with their research, but also participation/ integration in the research community [33].

Some practices of supervision that can reduce attrition and drop out of the PhD are summarized [4, 10, 11, 28, 34-38]:

- Write and acceptance by PhD students and supervisor of rights and obligations (written contract/rules defined by both);
- Induction and /or research skills training;
- Development of the students ability to balance creativity and criticism;
- Regular research-in-progress seminars, conference, workshops, formalized peer meetings;
- Supervision by academic panels, informal gatherings and collaborative meetings;
- Written progress reports (to monitor progress) and feedback during all doctorates, but also the use of graduate logs;
- Increasing students financial support;
- The student socialization promotion which comprises a good institutional climate and a sense of belonging, student inclusion in department activities, office space and technical support [4, 10, 11, 28, 34- 38].

2.4. An Exploratory Study at NOVA Lisbon University

The Nova Lisbon University is constituted by nine schools: Faculdade de Ciências e Tecnologia (FCT) (a science and technology school); Escola Nacional de Saúde Publica (ENSP) (Health school), Faculdade de Economia- Nova School of Business and Economics (Nova SBE) (Economics and management school); Instituto de Química e Bioquímica António Xavier (ITQB) (Science and health school); Instituto Superior de Economia e gestão - Nova Information Management School (Nova IMS) (information management school); Faculdade de Ciências Sociais e Humanas (FCSH) (Social sciences and humanities school); Faculdade de Ciências Médicas- Nova Medical School (NMS) (Health and medicine school); Faculdade de Direito (FD) (Law school); Instituto de Higiene e Medicina Tropical (IHMT) (Health and research on tropical diseases school). Each school has its own rules related to the PhD, but all obey to two important laws: decree-Law n.º 74 of 24 of March 2006, that approves the three-cycles organization in Portugal and the Bologna descriptors that are based on learning acquisition and competence development and decree-Law n. º 107/2008 (June 25), that underlines some of Bologna's objectives for higher education and regulates how they can be monitored and evaluated.

Institutionally the doctoral research monitorization process at Nova Lisbon University is guaranteed by a course commission in every school and by a monitoring commission in some UNL schools (FCT, FCM, IHMT, Nova IMS, ITQB, ENSP). The PhD evaluation process at Nova Lisbon University is attributed to the Scientific Commission of the PhD program and to the A3ES (Agency for Evaluation and Accreditation of Higher Education). This agency was established by the State through Decree-Law N. º 369/2007, of November 5, and that certificates the PhD programs, as well as master and first-degree programs.

3. Materials and Methods

The data were collected from the database RAIDES (Registo de Alunos Inscritos e Diplomados do Ensino Superior) which is a public national annual survey applied to all higher education institutions in Portugal, as it pretends to characterize the higher education system (http://www.dgeec.mec.pt/np4/raides/, accessed in 1 /9 /2017). Data were also collected from an institutional document produced by NOVA university: "A NOVA em 2011-2012: oferta curricular, docentes, estudantes, diplomados e empregabilidade" retrieved from http://www.unl.pt/data/qualidade/NOVA_em_2011-2012_ graficos_PT.pdf, accessed on 1/9/2017, and from "Relatório de actividades" accessed on 1/7/2017 and retrieved from the http://www.unl.pt/nova/relatorio-de-atividades.

For this study, the following definition was used:

$$Average\ time\ to\ complete = \frac{((N \times t \times n1) + (N \times (t+1) \times n2) + (N \times (t+2) \times n3) + (N \times (t+3) \times n4))}{N}$$

Where,

- N is the number of students that completed the PhD,
- t is the time to complete the regular time,
- t+1 is one year more than the regular time;
- t+2 is two more years than the regular time;
- t+3 is three more years than the regular time (we considered in this calculation that >t+2 corresponded to the maximum time of 3 more years than the regular time).
- n_1 is the percentage of students that completed the PhD in the t time;
- n_2 is the percentage of students that completed the PhD in the t+1 times;
- n_3 is the percentage of students that completed the PhD in the t+2 times;

- n_4 is the percentage of students that completed the PhD in the more than t+2 times.

The n values were obtained from the document "A NOVA em 2011-2012: oferta curricular, docentes, estudantes, diplomados e empregabilidade", accessed in 1st September 2017 and retrieved from http://www.unl.pt/data/qualidade /NOVA_em_2011-2012_ graficos_PT.pdf, Table 1. The regular time (t) is the average time considering all doctoral programs in each Nova Lisbon University school. For example, at FCT t (average time) is 3.6 years since it has 20 doctoral programs that need 4 years to be completed and 15 that only need 3 years; for FCSH is 3.7 years since it has 14 PhDs that need 4 years to be completed and 7 with a regular time of 3 years to be complete. In all other Nova University schools, the time to complete a PhD is 4 years.

4. Results

The number of students enrolled in the PhD is irregular over the years in every Nova Lisbon University schools between 2010 and 2015 (see Table 1). The number of PhD completed is also irregular, but is possible to observe that it increased twice during the analyzed period (see Table 1).

The number of students enrolled in the PhD degree at UNL isn't growing. The number of students who start the PhD at UNL in general is increasing since 2012/2013: in 2012/2013, 95 enrolled; in 2013/2014, 112 enrolled and in 2014/215 there were 134. As the number of students that completed the PhD is higher than the number of students who are enrolled for the first time, the number of total students is decreasing. At Nova SBE and at ISEGI/Nova IMS the number of students enrolled is increasing, as at IHMT and at ITQB.

The number of students that complete the degree (graduates) is increasing at ITQB since 2010/2011. At FCT the number almost doubled between 2010/2011 and 2011/2012, but after then it remained stable. The percentage of students enrolled and that completed the degree in the 2010/2011 and after four years, 2014/2015, in the UNL schools were compared (see Table 2).

Table 1. PhD students in Nova Lisbon University between 2008 and 2015. (Retrieved from http://www.dgeec.mec.pt/np4/raides/RAIDES accessed in 1 /9 / 2017).

PhD students at Nova Lisbon University schools		Years						Average
		2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	
FCT	Enrolled	589	539	563	494	456	426	511
	Completed	62	110	164	150	164	-	130
FCSH	Enrolled	939	868	910	911	636	650	819
	Completed	65	54	213	109	136	-	115
Nova SBE	Enrolled	36	33	42	47	58	71	48
	Completed	4	1	8	5	5	-	5
NMS/FCM	Enrolled	152	220	146	165	177	200	177
	Completed	3	7	14	24	15	-	13
FD	Enrolled	90	88	100	126	118	125	108
	Completed	0	0	4	16	6	-	5
IHMT	Enrolled	52	62	66	100	114	112	84
	Completed	14	1	9	8	9	-	8
ISEGI/ Nova IMS	Enrolled	34	34	39	50	82	89	55
	Completed	2	4	4	14	4	-	6
ITQB	Enrolled	243	252	251	246	265	270	255
	Completed	45	44	76	64	88	-	63
ENSP	Enrolled	59	68	75	86	98	105	82
	Completed	4	5	2	14	10	-	7
Overall	Enrolled	2194	2164	2192	2225	2004	2048	2138
	Completed	199	226	494	404	437	-	352

Between 2010/11 and 2014/15 there was a decrease in the number of students enrolled in the PhD at FCT and FCSH, but in the other schools there was a slight increase. The percentage of students that completed the PhD registered a small increase in the FCT and doubled twice at UNL in general.

In 2010/2011 it was possible to identify the schools in which a larger number of students were enrolled in the PhD at UNL: FCSH presents 43% of all students enrolled in a PhD at UNL, FCT has 27% of all students enrolled in a PhD at UNL and ITQB has only 11% of PhD students at UNL. But after four years (2014/2015) only 32% of the total of students that concluded the PhD were from FCSH and 23% were from FCT (see Table 2). These trends may be understood if we consider the time to complete the PhD in each school, drawing on the data collected from the document "A NOVA em 2011-2012: oferta curricular, docentes, estudantes, diplomados e empregabilidade" that enabled the construction of a table with the percentage of students that could complete the PhD in the regular time, in the regular time plus one year, at the regular time plus two years more and in a period longer than two years (see Table 3).

Table 2. PhD students enrolled and that complete the degree at Nova Lisbon University in 2010/2011 and 2014/2015.

Nova Lisbon University schools	PhD students	Year 2010/2011		Year 2014/2015	
		number	Percentage	number	Percentage
FCT	Enrolled	589	27%	456	23%
	Completed	62	31%	164	38%
FCSH	Enrolled	939	43%	636	32%
	Completed	65	33%	136	31%
Nova SBE	Enrolled	36	2%	58	3%
	Completed	4	2%	5	1%
NMS/FCM	Enrolled	152	7%	177	9%
	Completed	3	2%	15	3%
FD	Enrolled	90	4%	118	6%
	Completed	0	0%	6	1%
IHMT	Enrolled	52	2%	114	6%
	Completed	14	7%	9	2%
ISEGI/ Nova IMS	Enrolled	34	2%	82	4%
	Completed	2	1%	4	1%
ITQB	Enrolled	243	11%	265	13%
	Completed	45	23%	88	20%
ENSP	Enrolled	59	3%	98	5%
	Completed	4	2%	10	2%
Overall	Enrolled	2194	100%	2004	100%
	Completed	199	100%	437	100%

Data retrieved from http://www.unl.pt/nova/relatorio- de- atividades/, accessed in 4 /9 /2014 and from http://www.dgeec.mec.pt/np4/raides/ accessed in 1 /9 /2017.

Table 3. Percentage of doctorate students at Nova Lisbon University in 2010/2011.

Years to complete	% of doctorate students in 2010/2011 in Nova Lisbon University schools								
	FCT	FCSH	Nova SBE	NMS/FCM	FD	IHMT	ISEGI/ Nova IMS	ITQB	ENSP
Regular	64.5	12.3	75	0	0	71.4	100	31.1	0
Regular +1	14.5	18.5	25	100	0	28.6	0	35.6	60
Regular +2	12.9	32.3	0	0	0	0	0	26.7	0
Regular >+2	8.1	36.9	0	0	0	0	0	6.7	40

Retrieved from http://www.unl.pt/data/qualidade/NOVA_em_2011-2012_ graficos_PT.pdf. and accessed in 1 /9 / 2017.

From this data it is possible to observe that only PhD students at ISEGI/Nova IMS used the regular time, but it has to be noticed that there were only two students finishing the degree. In the other schools, many students took longer than the regular time. Drawing from this data it was possible to establish the average time to complete one for each of the schools (see Table 4).

The analysis of the results allows concluding that in the period analyzed (2010/2011) the time to complete registered at FCSH and at ENSP is respectively 6 years and 5.8 years. Students from ITQB and NMS/FCM need a year, more than the regular time. As mentioned before, in certain areas such as science and engineering students take a shorter time to complete the PhD degree (FCT, ITQB) than students in social sciences (FCSH). Being so, in 2010/2011 there was a gap between the ideal time (the time defined by the University) to complete the PhD and the real time used by doctoral students, but with the data collected in this research it was not possible to understand its causes, nor if this trend-oriented or point-to-point. This is converging with international research, since studies in the United Kingdom (UK), Canada, United States (US) and Australia highlighted that in science based disciplines time- to –complete is shorter than in social sciences, arts or humanities [4, 16, 18, 22 and 38]. We also analyzed the gender of students that completed the PhD, using the database RAIDES. This analysis enabled two conclusions: the first is that there are more women than men completing the PhD during the period between 2010/2011 and 2014/2015; the second is that only in economics in the Nova SBE and at ISEGI/NOVA IMS it is found that the number of women that complete the PhD was less than half.

Table 4. PhD students enrolled and that complete the degree in Nova Lisbon University in 2010/2011, and the average time that they need to complete the PhD.

Nova Lisbon University Schools (average time enrolled in years)	(Datas from 2010/2011)		Average time to complete
	Enrolled	Completed	
FCT (3.6 years)	589	62	4.2
FCSH (3.7 years)	939	65	6.0
Nova SBE (4 years)	36	4	4.3
NMS/FCM (4 years)	152	3	5.0
FD (4 years)	90	0	-
IHMT (4 years)	52	14	4.3
ISEGI/ Nova IMS (4 years)	34	2	4.0
ITQB (4 years)	243	45	5.1
ENSP (4 years)	59	4	5.8
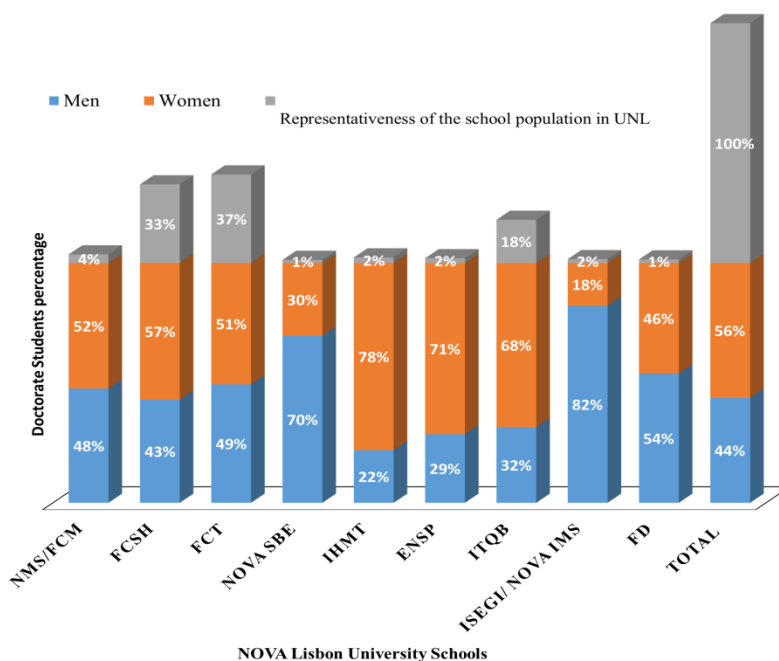
Figure 1. Percentage of doctorate that complete the PhD at Nova Lisbon University schools between 2010/2011 and 2014/2015. Men (blue), Women (orange) and the representativeness of the school population in UNL.

Considering all the doctorates, it should be highlighted that in five years (from 2010 to 2015) more women concluded the PhD. In 2010/2011, 58% of the students who completed their PhD were women. In 2011/2012 the percentage decreases toward 54%, and in 2012/2013 to 53%. An increase was observed in 2013/2014 with a percentage of women who conclude the PhD was 60% and in 2014/2015 it was 56 %. If we analyze the differences among UNL schools, we conclude that only in ISEGI/Nova IMS and Nova SBE the number of men that completed the PhD is superior to the number of women. Even in scientific areas (Science and Engineering) the number of women is higher than men, as we can conclude when considering the percentage in FCT, IHMT, ITQB and ENSP (see Figure 1).

These results are consistent with the literature: women are more likely to complete their degrees, but take more time than men [4]. There is also evidence that the relationship established between student and supervisor is related to gender and presents psychological advantages for students' men and disadvantages for students' women [21]. It should be highlighted that if gender is one of the factors associated with the completion of PhD, these results seem to indicate that in UNL it is associated with the timely completion. But with the data analyzed it was not possible to perceive if there are more women or men enrolled in the PhD, and this could also explain the trends identified.

As we can see from Figure 1, from 2010/2011 to 2014/2015 the science/engineering and health areas comprise 63% of the UNL PhD students (FCT doctoring 37%, NMS/FCM 4%, IHMT 2%, ITQB 18% and ENSP 2%). The Social sciences and Humanities areas include 34% of the UNL PhD students (FCSH with 33% and FD with 1%). The economic field only represents 3% of the UNL PhD students that complete the PhD (Nova SBE 1% and from ISEGI/IMS 2%).

It is important to note that there is no data related to age in the documents used in this study, but it should be interesting to analyze the distribution of age of women and men that enrolled in the PhD and the PhD areas, but also the prevalence of mature students from PhD areas.

In recent data (see Table 5, 6 and 7), it is possible to realize that women remain the major part of PhD students, and that only in NOVA IMS they are a minority. It is also important to highlight that scholarship holder constitute 21% of all PhD students in 2017/2018, although only 2.4% are enrolled in part-time (97.2% indicated that they were undertaking a full time PhD), see Table 7. It also should be highlighted that the number of PhD students is decreasing, but the number of foreign students is slowly increasing- in 2017/2018 they were 29.6% of the PhD students.

These data indicate that the internationalization of UNL is slowly rising, not only because of the increase numbers of published papers, but also because foreigner students and teachers are increasing (see https://www.unl.pt/nova/factos-e-numeros).

The number of scholarship holders (between 17 % and 21 %) also should be denoted, as well as the fact that the majority of PhD students are not worker students, so they need financial support from others source (usually family if they don´t have a scholarship) during the PhD journey.

Table 5. PhD students enrolled in the PhD at Nova Lisbon University (2015/2016). Retrieved from http://www.dgeec.mec.pt/np4/raides15/ on 11/10/2018

UNL School	PhD Students	Gender		Nationality		Worker student			First time inscription		Part time (half-time) PhD			Scholarship holder		
	Total	Man	Women	Foreign	Portuguese	No	Yes	NQ	No	Yes	No	Yes	NQ	No	Yes	NQ
FCM/Nova MS	211	87	124	4	207	183	28	0	172	39	152	59	0	205	6	0
FCSH	734	294	440	185	549	662	71	1	565	169	725	8	1	705	28	1
FCT	546	275	271	127	419	541	0	5	400	146	541	0	5	481	60	5
NOVA SBE	72	35	37	25	47	72	0	0	40	32	72	0	0	65	7	0
IHMT	115	37	78	57	58	113	1	1	93	22	114	0	1	113	1	1
Nova IMS	90	65	25	45	45	89	0	1	73	17	89	0	1	89	0	1
ENSP	107	25	82	21	86	107	0	0	87	20	107	0	0	107	0	0
ITQB	280	112	168	65	215	280	0	0	235	45	280	0	0	14	266	0
FD	127	67	60	39	88	127	0	0	103	24	127	0	0	109	18	0
Total	**2282**	**997**	**1285**	**568**	**1714**	**2174**	**100**	**8**	**1768**	**514**	**2207**	**67**	**8**	**1888**	**386**	**8**

NQ- Not questioned

Table 6. PhD students enrolled in the PhD at Nova Lisbon University in 2016/2017. Retrieved from http://www.dgeec.mec.pt/np4/raides16/ on 11/10/2018

UNL School	PhD Students	Gender		Nationality		Worker student			First time inscription		Part time (half-time) PhD			Scholarship holder		
	Total	Man	Women	Foreign	Portuguese	No	Yes	NQ	No	Yes	No	Yes	NQ	No	Yes	NQ
FCM/Nova MS	197	81	116	3	194	173	24	0	168	29	140	57	0	197	0	0
FCSH	658	270	388	175	483	608	49	1	495	163	651	6	1	624	33	1
FCT	527	264	263	135	392	514	0	13	384	143	514	0	13	447	67	13
NOVA SBE	98	49	49	36	62	98	0	0	75	23	98	0	0	98	0	0
IHMT	117	38	79	59	58	100	15	2	88	29	95	20	2	111	4	2
Nova IMS	82	56	26	42	40	81	0	1	66	16	81	0	1	81	0	1
ENSP	109	37	72	21	88	109	0	0	81	28	109	0	0	109	0	0
ITQB	272	105	167	65	207	272	0	0	227	45	272	0	0	12	260	0
FD	120	59	61	42	78	116	4	0	84	36	120	0	0	110	10	0
Total	**2180**	**959**	**1221**	**578**	**1602**	**2071**	**92**	**17**	**1668**	**512**	**2080**	**83**	**17**	**1789**	**374**	**17**

NQ- Not questioned

Table 7.　PhD students enrolled in the PhD at Nova Lisbon University (2017/2018). Retrieved from http://www.dgeec.mec.pt/np4/raides17/ on 11/10/2018.

UNL School	PhD Students	Gender		Nationality		Worker student			First time inscription		Part time (half-time) PhD			Scholarship holder		
	Total	Man	Women	Foreign	Portuguese	No	Yes	NQ	No	Yes	No	Yes	NQ	No	Yes	NQ
FCM/Nova MS	71	18	53	7	64	70	1	0	38	33	70	1	0	71	0	0
FCSH	677	276	401	202	475	655	22	0	526	151	674	3	0	637	40	0
FCT	521	253	268	128	393	513	0	8	385	136	513	0	8	432	81	8
NOVA SBE	88	40	48	40	48	88	0	0	71	17	88	0	0	88	0	0
IHMT	123	40	83	67	56	114	9	0	88	35	98	25	0	120	3	0
Nova IMS	73	53	20	40	33	73	0	0	58	15	73	0	0	73	0	0
ENSP	130	46	84	27	103	130	0	0	106	24	130	0	0	130	0	0
ITQB	325	131	194	75	250	325	0	0	240	85	325	0	0	14	311	0
FD	98	48	50	39	59	98	0	0	68	30	77	21	0	96	2	0
Total	**2106**	**905**	**1201**	**625**	**1481**	**2066**	**32**	**8**	**1580**	**526**	**2048**	**50**	**8**	**1661**	**437**	**8**

NQ- Not questioned

We can also analyze the data by area (see Table 8), and we can see that Experimental Science and Technology and social sciences and Humanity have almost the same percentage of students enrolled during the three last years. But the numbers of students that complete the PhD are different (Table 9). In 2015 only 245 PhD students complete their degree, and in 2016 they were 301. As we can see, in experimental science and technology area, there are more students completing their PhD (between 47% and 51%), following the Social Sciences and humanity Schools (32%- 36%). But from these data, we cannot perceive the attrition.

5. Conclusions

This analysis was aimed at characterizing the PhD population in each Nova Lisbon University schools, regarding the number of students that are enrolled and that complete the PhD degree, the nationality, the type of frequency (full time and part-time), but also considering gender and PhD scientific area. It was possible to observe in this university the same trends as others all over the world, regarding PhD attrition and time to complete.

A reflection about the Bologna implementation in the third cycle in UNL is already published [39], and a preliminary study conducted in the same university with the PhD students in Science Education [40] and supervisors is by this time published [41].

To better understand the trends regarding time completion and attrition it will be conduct a profound study of the supervision process at UNL. The research is already running and intends to build knowledge about the doctoral supervision process at the NOVA Lisbon University (UNL), considering three dimensions: the practices, the monitoring and its evaluation. To achieve this goal, a comparison study will be carried out on supervisor' and doctoral students' perceptions of supervision. The study will draw on documentary analysis, interviews and questionnaires to students and supervisors. During the research process, we intend to develop and validate tools to monitor and evaluate supervision practices that reinforce the resilience, satisfaction and well-being of the agents involved. This knowledge will allow a critical and enlightened reflection about doctoral education, attrition and completion times, improvement rules and the implementation measures proposed by the ministers responsible for higher education (MMHE) and the European association universities (EUA) at UNL. Finally, a supervisory practice recommendation, with procedures and instruments that can be applied, as well as a set of monitoring and evaluation practices for doctoral supervision, will be presented.

Table 8. PhD students enrolled in the PhD at Nova Lisbon University by scientific area. Retrieved from http://www.dgeec.mec.pt/np4/raides17/ on 11/10/2018.

UNL	School of Health and Medical Sciences				Experimental Science and Technology Schools			Social Sciences and humanity Schools			Economics and management science schools		
	Students number			% Students	Students number		% Students	Students number		% Students	Students number		% Students
Years	FCM/Nova MS	IHMT	ENSP	Overall	FCT	ITQB	Overall	FCSH	FD	Overall	NOVA SBE	Nova IMS	Overall
2015/2016	211	115	107	**19**	546	280	**36**	734	127	**38**	72	90	**7**
2016/2017	197	117	109	**19**	527	272	**37**	658	120	**36**	98	82	**8**
2017/2018	71	123	130	**15**	521	325	**40**	677	98	**37**	88	73	**8**

Table 9. PhD students that complete the PhD degree[1] in Nova Lisbon University by scientific area. Retrieved from. https://www.unl.pt/sites/default/files/relatorioatividades2015_web.pdf and https://www.unl.pt/sites/default/files/af_relatorio_2016_final_digital.pdf in 11/10/2018

UNL	School of Health and Medical Sciences				Experimental Science and Technology Schools			Social Sciences and humanity Schools			Economics and management science schools		
	Students number			Students %	Students number		Students %	Students number		Students %	Students number		Students %
Years1	FCM/Nova MS	IHMT	ENSP	Overall	FCT	ITQB	Overall	FCSH	FD	Overall	NOVA SBE	Nova IMS	Overall
2015	15	7	5	11	81	44	51	75	4	32	9	5	6
2016	28	9	5	14	90	52	47	103	4	36	6	4	3
2017	-	-	-	-	-	-	-	-	-	-	-	-	-

1 the qualification of PhD graduates was made per calendar year

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