
Immersive Training Weeks in Doctoral Education

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Abstract

Ph.D. training worldwide, including Doctoral education in Marketing or Engineering fields, has been in trouble for some time. These last turbulent times (pandemic, energy, inflation, and war crises) have only increased the problems previously reported by the 3rd cycle students and early career researchers, including chronic lack of support and poor-quality supervision, with senior researchers rarely trained in mentorship. It is also reported that Ph.D. candidates are inadequately prepared for the cross-disciplinary working and large teams that characterize cutting-edge science today. In the last two decades, opposite decisions took place in Europe concerning the curricula of Doctoral programs. In the 2010s, a large number of classes was added to the Ph.D.s, contributing to almost residual time for thesis research in the first year of the programs. However, ten years later, an abrupt change took place and almost all classes were removed from the Ph.D. curricula, creating a void in (hard and soft skills) training and leaving all the responsibility of training to the supervisor. Ph.D. students reported guidance and isolation issues in the first year. Moreover, today's little Ph.D. training is fully dedicated to the obtention of their Ph.D. and not to their role in society after the Ph.D. defense. This work discusses a new approach to doctoral education which started first at a professional doctorate implemented at University of Aveiro, Portugal, where few classes take place. This approach considers a novel Ph.D. training, both hard and soft skills development, through special intensive weeks, called Immersive Weeks. In these, distributed during the first year, Ph.D. students exclusively participate in several workshops, acquiring the tools for accomplishing both a successful Ph.D. and a future job. Pilots of this approach took place at the University of Aveiro with large success, while some improvement suggestions have also been pointed out by students.

Keywords: Doctoral education, innovation, Ph.D. training, reforming

1. INTRODUCTION

Today, the 3rd cycle of Higher Education studies is becoming as important as the 1st and 2nd cycles. This fact can be also observed in the increasing number of Ph.D. students in the last decades (Hnatkova, Degtyarova, Kersschot, & Boman, 2022), including the Ph.D. in Business or Marketing. However, early-career researchers face a challenging task when embarking on a career in academia due to the limited number of job opportunities available. Given that knowledge-based societies require highly skilled professionals outside academia, it is crucial to understand the role and significance of a Ph.D. in the labour market and the current employment prospects for Ph.D. holders (Hnatkova et al., 2022) and prepared them with soft skills for both the Ph.D. and for future work (Albertyn, 2022; Durette, Fournier, & Lafon, 2016).

Currently, Doctoral Education is deeply focused on the preparation of the students for the Thesis (Ciampa & Wolfe, 2019; Heflinger & Doykos, 2016) and, consequently, for research, disregarding future work outside academia. Despite this focus, in the last decades, many classes were added to the Doctoral programs. On the contrary trend, in the last years, these classes were substantially reduced to decrease the time required to conclude the Ph.D.

In this context, there seems to be a need to provide students with essential soft skills without the overburden of classes and without increasing the time for Thesis development.

This work aims to promote a discussion into a new approach to doctoral education in the actual doctoral programs' framework, now previously described. This approach considers a novel Ph.D. training, both hard and soft skills development, through special intensive weeks, called Immersive Weeks.

2. THE STARTING POINT

2.1. DOCTORATE IN BUSINESS INNOVATION AT THE UNIVERSITY OF AVEIRO

It is common knowledge that it is very difficult to pursue a Ph.D. while working full time, as the challenge of pursuing a Ph.D. is often incompatible with today's very demanding job activity. Accomplishing a Ph.D. while simultaneously working for a company requires aligning the medium and long-term goals of the Ph.D. research and the company's development. Unfortunately, this can be challenging because academia and industry often operate on different timelines and paces (Armsby, Costley, & Cranfield, 2018).

A Ph.D. typically takes 3 to 4 years and requires presenting an innovative thesis, which is evaluated through peer review in scientific journals. In contrast, companies need to continuously develop and adapt to the market, and cannot afford to wait for four years. Although ground-breaking innovations often take a decade to materialize, companies must keep generating revenue in the meantime (Proitz & Wittek, 2020).

Despite the challenges, it is possible to prepare for a Ph.D. with a global vision and multi-year planning, aiming to solve specific problems and improve significantly complex, interdisciplinary processes within companies. The ultimate goal is to bring innovation to the company while also meeting the scientific standards required for a Ph.D (Boud, Costley, Marshall, & Sutton, 2021; Cherkezishvili, Sanikidze, & Gibbs, 2020; Costley & Lester, 2012). To achieve this, perfect alignment between the company, the university, and the student is necessary (see Fig. 1).

However, this level of alignment can only be achieved if the student shares the company's mindset and is fully committed to its mission. Previous experiences with non-academic Ph.D. programs have shown that this alignment is only possible when the student comes from the company and there is a mutual commitment between the student (as a company resource) and the company itself. Also, group supervision is a success factor (Fenge, 2012). Research on these topics remains scarce (Assbring & Nuur, 2017).

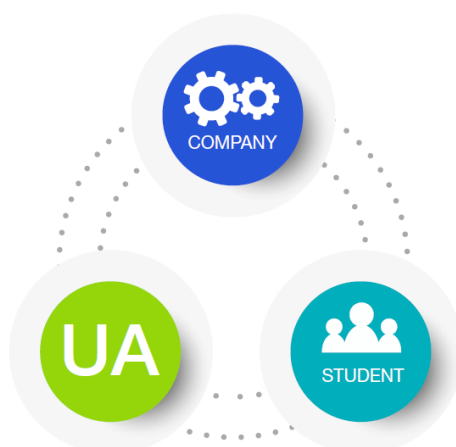


Figure. 1 The collaboration between the University, the company and the student. For a Ph.D. degree, the addition of the company to the project rises the complexity of synchronization and balance. For today's Ph.D.s, even in classical Ph.D., the job market (here represented by the company) must be also considered when structuring the curriculum.

Source: own elaboration

The University of Aveiro (UAveiro) has developed the Doctorate in Business Innovation (DBI) as part of its innovation strategy and to strengthen its ties with the business community. However, unlike most Ph.D. degrees (Sarrico, 2022; Wildy, Peden, & Chan, 2015), the DBI was initiated from the request of companies rather than as a product of the scientific community. The motivation relied on companies to be able to foster innovation within their organizations while retaining full ownership of the results, maintaining lower costs compared to service contracts, and having greater flexibility in the funded research projects. Nonetheless, to achieve this, multidisciplinary guidance from a non-competing institution such as a university was still deemed necessary.

Initially, the DBI program was designed by adapting the existing Ph.D. structure to meet the specific needs and requests of the companies. However, it quickly became apparent that the traditional Ph.D. curriculum, including regular first-year classes, was not suitable for this challenge, even when delivered online. In response, a new structure was created, consisting of "immersive" working weeks. For three weeks per academic year, students attend the University to:

- acquire research tools and methodologies;
- fully focus on the scientific aspects of their Ph.D.;
- separate themselves from their companies' daily dynamic;
- participate in multidisciplinary innovation networking;
- meet intensively with their supervisors.

These Immersive Weeks were introduced in the 2020/2021 academic year and have undergone two years of pilot editions, including one online edition due to COVID-19 constraints.

The setup of the DBI program involved two distinct phases: (i) the theoretical design and prototyping and (ii) the establishment of the program as a 3rd cycle training product.

However, in addition to the challenges previously described in designing a Ph.D. program for company staff, the approval and certification of the degree by authorities at the university and government levels encountered significant difficulties. The DBI program was disruptive compared to traditional Ph.D. degrees and the academic culture, which heavily emphasizes knowledge-based lectures and full-time research work, which brought difficulties in understanding how a Ph.D. could be adapted to the needs of companies.

Even the government authorities responsible for Higher Education Institutions (HEI), represented by an academia-origin jury panel, struggled to comprehend the DBI's goals within the HEI framework. It required

several reports and documents before the program was finally accepted as a new Ph.D. One of the main challenges was conveying that the DBI was not a Ph.D. in business administration or designed solely for the study of business innovation, but rather a Ph.D. to produce innovation for and with(in) companies.

2.2. THE DBI, INNOVATION AND MARKETING

The DBI is a Ph.D. whose main goal is to develop innovation for companies, without establishing boundaries in scientific fields. This 3rd cycle degree responds to contemporary challenges that are, generally, multidisciplinary and cannot be constrained to the scientific field of engineering, design, or management.

All supervision teams in DBI are composed of two to three doctors (Ph.D. professors or researchers) who mandatorily hail from different scientific fields. Considering that a larger part of today's innovation comes from all scientific fields, some supervision teams have members from the field of Marketing.

Moreover, the research topic of a larger part of the thesis projects includes business problems, where Marketing has an important role.

3. THE EXTENSION TO ALL DOCTORAL PROGRAMS

The experience taken from the Immersive Weeks, prototyped and tested in the DBI, showed that this model is aligned with the need to provide both hard and soft skills for both the thesis and the job market in an intensive approach for all 3rd cycle degrees (see Fig.1). Therefore, it seems to be the solution for the aforementioned problem of increasing the competence development and not to overload students and candidates with classes that deviate their attention from the research and thesis aims.

An adaptation of the previous Immersive Weeks was made in November 2022 to encompass a larger audience. The University of Aveiro has 52 doctoral programs and more than 1000 3rd cycle students, however, less than 200 are enrolled in the first year. Therefore, the workshops and seminars must be prepared for an audience of an auditorium, yet a classical lecture structure must be avoided. The Immersive Weeks were called Doctoral School Immersive Weeks (DSIW) considering that these are being coordinated by the Doctoral School of the University of Aveiro.

3.1. GOAL AND INTENDED LEARNING OUTCOMES OF THE 1ST DSIW

The 1st DSIW, called Immersive Week due to its dynamic and intensity, had the following goals:

- Contribute to the elaboration of the Research Plan, from the perspective of the scientific questions and hypotheses raised, and description of the state-of-the-art in the area in question, the research objectives, lines of work to be developed and the methodologies to be applied, and development of a timeline. The document to be presented by the student at the end of the week must include a description of the expected results and indicators, including the ethical and social repercussions.
- Contribute to develop the competences in the domains of literature review, critical thinking, creativity and innovation, a deep knowledge of the chosen topic of study, ability to define and to schedule the work, ability to write a document that reflects clearly and concisely the state of the art and the ability to present and to discuss the work. However, the full competences in critical thinking and innovation will be acquired during the following weeks and up the student's work.
- Learning specific topics/modules/courses by the student considering the theme of his/her doctoral work program and acquisition of complementary skills.

Concerning the competences gained during the 1st DSIW, it had a particular focus on the ability to draw up a map of research and report on its progress as it is a fundamental capability for the development of modern scientific research.

Another goal of this week was the full commitment of the students to pursue the Ph.D. throughout its duration. Therefore, at the end of this working week, which takes place at the beginning of the year, a decision must be made by the student concerning their commitment and maintenance in the doctoral program.

The target group of the 1st Immersive Week was the first-year students of the doctoral programs of the University of Aveiro. However, Ph.D. students of other years and all doctoral programs were invited as well and could profit from the knowledge shared during this week.

3.2. AGENDA AND WORKSHOP SELECTION

The seminars and workshops of the 1st Immersive Week (see Fig. 2) were chosen to provide the Students with soft skills and tools to start their Ph.D. at a higher pace, knowing that some of these skills are also useful for the job market. Some are briefly described next.

Agenda - Doctoral School immersive week 2022

	Monday 7	Room	Tuesday 8	Room	Wednesday 9	Room	Thursday 10	Room	Friday 11	Room
09:00					Scientific coordination and management of projects <i>António Valente</i>	A	Paper writing & ethics <i>José Carlos Pedro</i>	A	Preparing scientific figures, a tale of vectors and magnifying glasses <i>João A. Dias-de-Oliveira</i>	A
10:00	Welcome for all PhD students. Immersive week at a glance, Milestones & research summit	A								
10:30	Obstacles and opportunities for science communication at the University of Aveiro <i>João Afonso Correia</i>	A	Workshop on Systematic review <i>Irina Saur-Amaral</i>	A	Individual work: defining the Ph.D. timelines and milestones as a project to be managed				Individual work: preparing a graphical abstract	A
11:00	subGQ_PD: your guardian angel for the quality <i>Maria João Pires da Rosa</i>	A			Identifying the starting point of the work and planning – exercises 2 and 3 <i>A. Gil Andrade-Campos</i>	A	Producing a paper structure and planning. Design of the first paper using the Paper Design Canvas - exercise 4 <i>A. Gil Andrade-Campos</i>	A	Open session PhD difficulties and experience sharing	A
12:00	Wrap up	A					Wrap up	A	Wrap up and temasPG	A
13:00	Lunch (OYO)		Lunch (OYO)		lunch (OYO)		lunch (OYO)		lunch (OYO)	
14:00	Scientific information sources <i>Diana Silva (SBIDM)</i>	A	How some maps can help you starting your research: research design canvas – Introduction & exercise 1 <i>A. Gil Andrade-Campos</i>	A			Text processors - World is not only the text processor <i>A. Gil Andrade-Campos</i>	A	Open visit to the Campus (14h30) <i>Joana Albino</i>	
15:00					Entrepreneurship and industrial property in Doctoral Programs <i>Marta Marques, Eva Andrade, Patrícia Mostardinha (UACOOPERA)</i>	A	Individual work: Create an abstract for the research summit using word and LaTeX	A		
16:00	Managing bibliographic references with Mendeley <i>Diana Silva (SBIDM)</i>	A	Scientific, commercial and industrial reviews. Different reviews for different goals and from different sources. <i>A. Gil Andrade-Campos</i>	A			Creating the Canvas 1.0 and Pitfalls during the Ph.D. – exercise 5 <i>A. Gil Andrade-Campos</i>	A		
17:00			Individual work: search for a first state-of-the-art paper data-base		Wrap up	A	Wrap up	A		
	19h00 Batucadeiras de Cabo Verde Auditorium of the Art and Communication Department				18h00 Gathering for networking and "beers" building in the Campus (activity dependent of the weather)		21h30 Concert in <i>Festivais de Outono</i> , Rectory building O Sétimo Sol* (music, illustration and story telling)			

Figure 2 Agenda of the first Immersive Week of the academic year 2022

Communication seminar: Obstacles and opportunities for science communication. This workshop addressed the difficulties of science communication with the broad public. It also addressed the questions of why scientists should make their work known to the general public, what is the importance of mass media in this communication process and what gains can be made by researchers, the institutions where they work and the population.

The role of the quality systems in the doctoral program. With the aim of assuring that Ph.D. students have the best possible doctoral education. Considering that the UAveiro doctoral programs comprise both research work and doctoral courses, the quality system focuses on the strengths and weaknesses of these two components to answer the question: How to assure and improve doctoral education quality? The workshop

focused on the main characteristics of this subsystem, paying particular relevance to the role of students within it. Considering the results obtained so far, it is believed that such a subsystem may indeed act as a guardian angel for the quality of UAveiro's doctoral education and its future sustainability.

Scientific information sources and managing bibliographic references with dedicated tools. This workshop provided information about scientific databases available at the university, database search methods (Scopus and Web of Science Core Collection) and strategies to make literature reviews, aiming to promote the essential skills for search, analysis, selection and retrieval of scientific information. The session also explored a simple way of managing bibliographic references retrieved from different databases and repositories with the Reference Manager tools.

Systematic Literature Review workshop. The Systematic Literature Review workshop focused on the planning, execution and partial reporting included in the systematic literature review methodology, which may be used by researchers to develop the state-of-the art or the specific literature reviews required for their projects. The workshop aimed to present students a practical approach they can use at the beginning of their research to identify schools of thought and better define the gap and position of their research.

How some maps can help you starting your research: research design canvas. The first year of a Ph.D. can be managed with the help of some tools that can guide the students to understand how research works and how to design an integrated research plan. The research design canvas is a map that can be used to easily understand academic research and design a doctoral research project. It can be also used as a gamification tool, simplifying academic research into nine building blocks and enabling a bird eye view of key decisions and aspects of the thesis project. In this workshop, the research design canvas of Ben Ellway (academicacademic-toolkit.com [6]) is used and an academic self-assessment exercise is promoted.

Scientific, commercial, and industrial reviews. Different reviews for different goals and from different sources. Today, research is not only academic since a large number of industrial and non-academic companies do research and development. The latter do not publish their developments in scientific journals, which makes the knowledge public and non-proprietary. Patents and other industrial property publications are the priority of companies. However, other companies prefer to keep their research secretly and, therefore, the novelties can be seen in their products and services. In this workshop, the scientific state-of-the-art review was highlighted as not being the only review required for a Ph.D. student. An introduction concerning industrial and commercial reviews was given.

Scientific coordination and management of projects. This workshop aimed to contribute towards the increase in project management competency and lead to increased project efficiency and success. The workshop introduced basic scientific project management concepts and provides the context for a better understanding of project management methodology. It provided guidelines for managing individual projects and defines project management-related concepts. It describes the project management life cycle and its related processes. Also, it looked into different project management approaches. This workshop helped establish a Ph.D. also as a project, defining the Ph.D. timelines and milestones as a project to be managed. In the practical part of the workshop, the students were invited to draft an initial timeline of their Ph.D. works considering the Ph.D. as a project to be managed by themselves.

Industrial property and legal rights. This seminar was dedicated to industrial property and legal rights. The industrial property included patents, trademarks, industrial designs, and geographical indications; whereas copyright includes literary works, films, music, artistic works and architectural design and rights related to the same inclusive of rights of performers, artists, producers, and broadcasters. This seminar introduced the students to Intellectual Property (IP) Law in general and in Industrial Property (patents) and Copyright, in particular. The seminar provided an overview of the main principles and legal rules of IP Law, focusing specifically on the theoretical and practical connections between IP and academic/scientific works/studies and on the IP issues with which the students are likely to come into contact with their different areas of knowledge. These issues included: (i) generating and protecting intellectual works; (ii) protection of academic/scientific works/studies by industrial intellectual property rights. (iii) ownership of industrial intellectual property rights. (iv) rights resulting from industrial intellectual property rights, infringement of

industrial intellectual property rights (with particular emphasis on patent infringement and plagiarism), and free use of intellectual property rights. At the end of the seminar, students would have developed an awareness of the relevance and impact of IP Law on their Ph.D. and academic and professional lives.

Paper Writing and Ethics. This seminar was intended to provide the students with the basics of scientific publication, i.e., the dissemination of scientific results, and the scientific community's code of ethics that sustains it. Therefore, the lecture started with a review of what characterizes scientific knowledge and the methodology – the scientific method – that assured that the produced results can be accepted as scientific. Then, it addressed the various forms of dissemination of scientific information – namely, books, academic thesis, journal papers and conference presentations – describing in detail the various parts that constitute an academic thesis or a journal paper. Then the lecture moved on to describe a typical (singly or doubly) blind review process, the traditional and open access publication models, and the associated code of ethics that underlies all of this.

Text processors - The world is not only the Word processor. In this workshop, some advanced features of the word processor were presented. Additionally, other text processors specifically made for scientific writing, such as LaTeX, were also presented and discussed. This workshop was practical and developed the skills of the students with writing tools.

Preparing scientific figures, a tale of vectors and magnifying glasses. Preparing scientific figures is an essential part of a research project, where data preservation, readability and aesthetics need to be balanced. The trick is usually in the details! This doesn't need to be a stressful or expensive experience, even when preparing conceptual images to describe the research. Free powerful open-source software is available. In this individual work, the students were invited to prepare the best as possible the graphical abstract of their Doctoral work or of a paper to be prepared. Soft skills related to visual communication were developed in this workshop.

Open session - Ph.D. difficulties and experience sharing. This session was an open format where all Ph.D. students of the University shared their experiences and main difficulties through the process of developing and obtaining a Ph.D. This discussion session was very important to all students because solutions were also discussed and shared among students.

Other workshops were developed for the 2nd Immersive Week, also addressing other knowledge and soft skills. It must be highlighted that during the Immersive Weeks the students produced a large number of outcomes and deliverables, addressing stages of their thesis project and rethinking initial project designs. The students have been consequently evaluated and can obtain approval of 2~4 ECTS, contributing to one curricular unit named Free Option.

3.3. ASSESSMENT OF THE IMMERSIVE WEEK BY THE STUDENTS

An overall evaluation of the week by the students of one doctoral program can be seen in Figure 3. Some of the comments received from the evaluation form sent in the week after, and from anonymous students of different nationalities, are presented next.

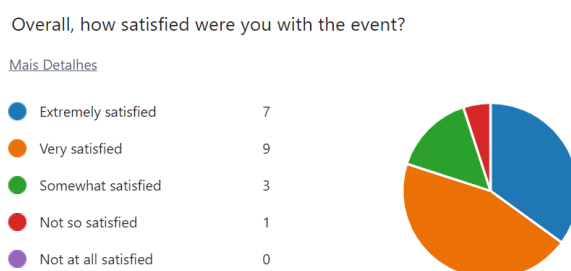


Figure 3 Measurement of the satisfaction. More than 75% of the students were extremely satisfied or very satisfied.

Weakness points or topics to further improvement identified when replying to the question “What did you like the least about the event?”:

- *“Obstacles and opportunities for science communication”;*
- *“The time management // Some problems with time; Certain activities did not start at the scheduled time, or they were longer than expected; I did not like that sometimes the lectures ended late and it messed up some activities or other lectures following”;*
- *“Too theoretical with long speaking sessions”;*
- *“A lot of challenges before the trip to organize the week, here a basic help would be nice (Hotel room, public transportation in Aveiro...)”.*

Strong points or aspects to be kept in future editions, when replying to “What did you like the most about the event?”

- *“The general information about PhD”;*
- *“The interactivity between speaker and public”;*
- *“Overall contents”;*
- *“Some of the topics were very interesting”;*
- *“Intensive work - and the opportunity to discuss was always given”;*
- *“The tips with canvas and the systematic literature review. But overall, all the lectures were helpful for me”;*
- *“The event was really well conceived for first year students. I found the advices given by the lecturers really connected to reality and useful. The knowledge passed on to the audience was the possible for the limited time of the sessions and I think it facilitates further exploration of the subjects by the students”.*
- *“The People”;*
- *“Aveiro University is an outstanding place, all sessions have been super inspiring, within the first week my supervisor team was defined”.*

General suggestion about the Immersive Week, answering the question “Can you give general suggestions to improve the event?”

- *“This kind of event to be done every year”;*
 - *“More marketing for this event, I’m sure all PhD students need to participate”;*
 - *“Would have been important to have scheduled meetings at least one meeting with the suggested supervisors during the event: some of them were not on campus etc”.*
 - *“Maybe the next event should be in a place with more energy power sources for the laptops”;*
 - *“I think there was lack of time to properly train the skills learnt in some theoretical sessions”*
 - *“More practical, more dynamic”.*
 - *“I really enjoyed this event, I would actually like to congratulate the organization, I think the first year PhD students needed something like this from UA”.*
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4. CONCLUSIONS

Although the assessment shows that there is space for improvement, namely in the area of time management and some lectures that had too much of an expositive approach, it also shows that Immersive Weeks can be a good strategy for training in the 3rd cycle, where a balance between hard and soft skills are required for both the goal of achieving a Ph.D. Thesis and preparation for the job market. Students made quite enthusiastic remarks about the usefulness of the 1st Immersive Week developed in November 2022, and with due adjustments and more communication of the week in 2023, there is space to involve a higher number of students from the first year of the Ph.D.s at UAveiro and further refine the approach.

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