Perceptions of Early Career Researchers Regarding Competence Development

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Abstract

PhD studies lead to highest level of academic qualification, promoting the development of competencies that qualify for performance as leaders in the generation of scientific knowledge and its application to the improvement of society, through research and innovation. The competencies development involves a demanding formative journey in which the individual and contextual factors are important. This research reports early career researchers' perceptions about learning expectations, difficulties and resources at the beginning of the training; partial perceived learning, difficulties and resources at the middle of the training; and, perceived learning at the end, once the doctoral dissertation was defended and approved. The results allowed to identify the most important contextual and individual factors in each of the training phases and how them affect the development of competencies. These findings have important implications for the organization and development of doctoral studies.

Keywords:
doctoral studies, early career researchers, skills, affective aspects in learning, researcher identity.

Percepciones de Investigadores en Formación respecto al Desarrollo de Competencias

Resumen

Los estudios de doctorado conducen al nivel más alto de cualificación académica, promoviendo el desarrollo de competencias que habiliten para el desempeño como líderes en la generación de conocimiento científico y en la aplicación del mismo a la mejora de la sociedad, a través de la investigación y la innovación. El proceso de adquisición de competencias supone un recorrido formativo exigente y de larga duración que conlleva dificultades que es necesario vencer con ayuda de factores tanto personales como contextuales. En esta investigación se ha recogido información sobre las percepciones de los y las investigadoras en formación respecto al proceso de aprendizaje en los tres momentos del programa de

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doctorado: expectativas de aprendizaje, dificultades y recursos en el inicio, dificultades y apoyos experimentados, así como aprendizajes parciales percibidos en el proceso, y aprendizajes percibidos al final, una vez defendida y aprobada la tesis doctoral. Los resultados han permitido identificar los aspectos contextuales e individuales fundamentales en cada uno de los tres momentos de la formación de las personas investigadoras. Estos hallazgos tienen importantes implicaciones para la planificación y el desarrollo de la formación doctoral.

Palabras clave:

doctorado, formación investigadora, desarrollo de competencias, afectividad en el aprendizaje, identidad investigadora.

Percepções de Pesquisadores em Formação respeito do Desenvolvimento de Competências

Resumo

Os estudos de doutorado conduzem ao nível mais alto de qualificação acadêmica, promovendo o desenvolvimento de competências que facilitem o desempenho como líderes na geração de conhecimento científico e na aplicação deste conhecimento à melhora da sociedade, através da pesquisa e inovação. O processo de aquisição de competências supõe um percurso formativo exigente e de longa duração, que acarreta dificuldades que é preciso vencer com ajuda de fatores pessoais e contextuais. Nesta pesquisa levantou-se informação sobre as percepções dos e das pesquisadoras (8 participantes, 5 mulheres e 3 homens) em formação a respeito do processo de aprendizagem nos três momentos do programa de doutorado: expectativas de aprendizagem, dificuldades e recursos no início, dificuldades e apoios experimentados, assim como a aprendizagem parcial percebida no processo e a aprendizagem percebida no fim, uma vez defendida e aprovada a tese doutoral. Os resultados permitiram identificar os aspectos contextuais e individuais fundamentais em cada um dos três momentos da formação dos pesquisadores. Estes achados têm importantes implicações para o planejamento e o desenvolvimento da formação doutoral.

Palavras-chave:

doutorado, formação em pesquisa, desenvolvimento de competências, afetividade na aprendizagem, identidade pesquisadora.

Introduction

Doctoral studies allow obtaining an advanced knowledge, develop leadership functions and conduct research (Gregor & O'Brien, 2015; Hoyne, Alessandrini & Fellman, 2016). In recent years, doctoral studies had evolved due to new demands that are imposed on them (Melin & Janson, 2006), which require teaching new skills and competences. These learnings are developed at the same time as the professional identity is being shaped.

Training of researchers based on competences

In Spain, doctoral studies are regulated by the Royal Decree 99/2011 of January 28th. Among the principles that support this regulation there is the intention that the doctorate has a leading role at the intersection between the European Higher Education Area (EHEA) and the European Research Area (ERA). It is considered that doctors should be key players in the production, transfer and adaptation of R&D + i leading the process that starts with knowledge and ends in society's welfare. Therefore, an excellent researcher training is crucial. For this graduation profile, considering the functions to be carried out, a series of competences to be developed is proposed.

The Spanish Qualifications Framework for Higher Education (Marco Español de Cualificaciones para la Educación Superior) - MECES regulated by Royal Decree 1027/2011 of July 15th, describes in Article 8 the fourth level on advanced training in research techniques. Based on the learning mentioned in the MECES, Article 5 of Royal Decree 99/2011 includes two groups of competences that must be developed by doctorate students. The first group refers to the basic competences (BC):

- BC1. Systematic comprehension of a field of study and mastery of research skills and methods related to that field.
- BC2. Ability to conceive, design or create, put into practice and adopt a substantial process of research or creation.
- BC3. Ability to contribute to the expansion of knowledge frontiers through original research.
- BC5. Ability to perform a critical analysis and evaluation and synthesis of new and complex ideas.
- BC6. Ability to communicate with the academic and scientific community and with society in general about their fields of knowledge in the modes and languages commonly used in their international scientific community.
- BC7. Ability to foster—in academic and professional contexts—scientific, technological, social, artistic or cultural progress within a knowledge-based society.

The second group includes those capacities and skills that favor high professional training in areas related to innovation (HC):

- HC1. Ability to perform in contexts in which there is little specific information.
- HC2. To find key questions that must be answered to solve a complex problem.
- HC3. To design, create, develop and undertake innovative and groundbreaking projects in their field of knowledge.
- HC4. To work both as a team and independently in an international or multidisciplinary context.
- HC5. To incorporate knowledge, face complexity and formulate judgments with limited information.
- HC6. Critique and intellectual defense of solutions.

On the other hand, Durette, Fournier & Lafon (2016) organize the learning and competences that are acquired during doctoral studies into six groups:

a) Knowledge and specialized technical skills from a specific field of knowledge or particular techniques.
b) Transferable competencies that can be "formalized", which can be used in a wide variety of professional situations and "learned" through courses such as language, project management or communication skills.
c) Transferable competencies that "cannot be formalized", they can be used in a wide variety of professional situations but "cannot be learned" through formal courses, such as the ability to deal with complex problems, the ability to collaborate, leadership, innovation capacity, a broad vision, etc.
d) Dispositions that include aptitudes and qualities such as rigor and creativity.
e) Behaviors which range from stress management to perseverance including, among others: resilience, dynamism, and honesty.
f) Meta-competences are those useful either to develop one's own competences or to make a better use of it in professional situations. They are learning capacity and adaptation capacity.

Each doctoral program—normally with a high degree of autonomy—must provide the necessary means to favor students achieving the aforementioned competences.

Influential factors in researcher training

In the development of these competences, many aspects must be taken into account—both contextual and personal—that interfere by facilitating or impeding learning (McAlpine & Lucas, 2011).

Lovitts (2008) researched facilitators and obstacles in different doctoral programs in pure sciences and social sciences of two American universities. He found that students who did not complete doctoral programs had difficulty finding interesting ideas, had fewer personal and social resources, and their tutor did not carry out proper accompaniment during the process. Additionally, Furr & Brown-Rice (2016) identified several actions in the supervision of dissertations that hinder the student's progress, such as lack of honesty, excessive tardiness in giving feedback, poor supervision skills, and difficulty controlling emotions

On the other hand, Lovitts (2008) identified in the students that completed the doctoral program a strong motivation for the research they were conducting, proper advice and positive interactions both with their director and with their peers. Juniper, Walsh, Rochardson & Morley (2012) confirmed the positive relationship between the

well-being of doctoral students and the existence of adequate social relationships.

This was made visible by Ng (2017), who analyzed their own emotions while going through doctoral studies and how these affected the process of writing the dissertation. Along the same lines, Morrison-Saunders, Moore, Hughes & Newsome (2010), pointed out that doctoral studies causes students to feel like they are on an actual "roller coaster", since they can experience both negative and positive emotions. Anderson (2017) verified that the doctoral process affects the thoughts, actions, behaviors, and emotions of students, aspects that have influence as well in decision making during the learning process regarding the intellectual demands required (Cantwell, Scevak, Bourke & Hoolbrok, 2012; McLaughlin, 2003). Therefore, the role of emotions in learning is important (McLaughlin, 2003) and vice versa.

Several investigations highlight the fundamental role of advising and social support in emotions. Regarding advising, Pyhältö & Keskinen (2012) pointed out that the role of the supervising person is crucial, among other aspects, in the promotion and integration of students into the academic community. With their support, they would find in this context a source of inspiration and empowerment for the student own's learning.

In relation to social support, Jairam & Kahl (2012) observed that the three sources of social support (academic friends, family, and faculty) provide assistance, reducing stress in the students, and thus favoring the completion of studies. Therefore, the authors advise doctoral students to build friendships in the academic field, to seek help from family members to carry out certain tasks, and to establish an appropriate and active professional relationship with the person that directs their doctoral dissertation.

The emotions and feelings experienced in the doctoral process influence student satisfaction regarding the doctoral program (Cheng, Taylor, Williams & Tong, 2016), which, at the same time, is shaped by their expectations. In relation to negative emotions, several studies show that the emotional and motivational problems experienced by doctoral students throughout the supervision and research processes can determine failure and dropping out (Cotterall, 2013; Jairam & Kahl, 2012).

Ultimately, throughout the doctoral process, individual and contextual factors that favor or hinder the development of competences can be found, affecting also the emotions during the process, which, in turn, influence learning. According to the research carried out, personal aspects such as motivation, the ability to organize and make decisions, and the background act as process facilitators, while the absence of these elements suppose barriers to learning that can lead to dropping out (Castelló, Pardo, Sala-Bubaré & Suñe-Soler, 2017). At the same time, contextual elements such as proper supervision and social support, both in the academic and personal levels, are considered facilitators, while insufficient and inadequate supervision and the absence of social support hinder training. The presence of barriers is associated with the manifestation of negative emotions, which negatively interfere in learning (Spaulding & Rockinson-Szapkiw, 2012), although their effect can be reduced due to facilitators (Peltonen, Vekkaila, Rautio, Haverinen & Pyhältö, 2017).

Despite the importance of these elements in doctoral training, up until now, these aspects have not been sufficiently studied, considering the perspective of doctoral candidates in real time at the different stages of the process and focusing on those aspects which are important in each phase: expectations at the beginning, difficulties, resources and partial learning in the process, and final perceived learning. Therefore, this is the objective of this research.

Method

Design

In order to meet the presented objectives, a qualitative study was carried out, applying a questionnaire of open questions to students in three stages of doctoral training, at the beginning, during the process, and at the end of the studies.

It began with information collection in the 2013/2014 academic year and the collection was completed in the 2017/2018 academic year. Cases that had participated in the research during the three stages of their doctoral training were considered for the study.

Context

The study is carried out in a Spanish university focusing on the training of researchers in the Education area. The research involves students of two doctoral programs, one according to Decree 1393/2007, and another according to Decree 99/2011. The average number of new students in both programs during the years of research information collection is 10.5.

The students' profile of both doctoral programs is similar. The socioeconomic level is medium-high, with a predominance of women (67%). Regarding age, the range is between 25 and 56. There is a high percentage (33%) of international students, with great diversity in relation to the place of origin, reaching 15 different nationalities, and with a high predominance of Latin American countries. The vast majority of foreign students have some kind of help for funding their studies.

Participants

In order to meet the objective, students were invited to provide information at three stages of the doctoral process, at the beginning, during the process and at the end—once the doctoral dissertation was defended. However, not all of students completed the three questionnaires, due to, among others, the following reasons: a) start of the doctoral program before this research was initiated; b) dropping out doctoral studies; c) interruption in the participation of this investigation.

Eight people met the inclusion criteria for the study sample, five women and three men. Their age range at the start of their studies was between 25 and 47 years. The university studies that gave them access to the doctoral program were philology, communication, education, pedagogy, physics, and history. Four people belonged to a doctoral program regulated by Decree 1393 of 2007, while the remaining studied the doctoral program regulated by Decree 99 of 2011.

Instruments

The information has been collected through three questionnaires of open questions answered at the beginning, during the process, and at the end. These questionnaires are based on the scripts of interviews applied and validated in a previous investigation carried out with the same group of students (Villardón-Gallego & Yániz, 2013). Once designed, the questionnaires were reviewed and endorsed by an assessment committee made up of three doctors specializing in research in education, two of them faculty members of the doctoral program.

The three complete questionnaires included a part intended to collect information on sociodemographic and academic characteristics, such as age, sex and entrance training. In addition, they contained questions aimed at knowing different aspects of their doctoral course. In accordance with the objective of this study, the following questions have been selected for analysis:

- The Initial Questionnaire (IQ) analyzed the following seven questions centered on expectations: 1) What do you expect from the doctoral program? 2) What do you think you are going to learn in the doctoral program? 3) How do you think the doctoral dissertation process will be? 4) What difficulties do you expect to find and how do you expect to solve them? 5) What factors, elements, aspects do you think will help you overcome difficulties during doctoral research? 6) Point out your strengths to carry out research; 7) Point out your weak arear to carry out research.

- The Process Questionnaire (PQ) considered four questions about difficulties, support, and intermediate learning: 1) What do you think you are learning in the doctoral program? 2) How do you think the doctoral dissertation process is going? 3) What difficulties have you faced and how have you solved them? 4) What factors, elements, aspects do you think have helped you overcome difficulties during doctoral research?

- The Final Questionnaire (FQ) analyzed two questions related to perceived learning: 1) What did you learn in the doctoral program? 2) From your experience, what training do you think is necessary to complete the doctoral dissertation?

Process

At the beginning of doctoral studies, the students were explained the objective of the research and the confidential nature of the collected informa-

tion, requesting their voluntary participation. In order to protect anonymity, the name of the eight participants has been modified for a nickname.

Information was collected annually from 2013 to 2017, starting with the IQ, continuing with the PQ, and finalizing with the FQ. There is a situation where, depending on the length of the doctoral course, some participants completed more than one PQ. In this case, the questionnaire answered in the middle of the process has been selected for the analysis—considering the time elapsed from the beginning to the end.

Data analysis

The answers to the questionnaires have been analyzed with the aid of the Maxqda program, identifying the expectations, difficulties, supports, emotions. and perceived learning of each one of the eight participants.

To perform the analysis of the answers to each of the previous questions, two different types of categorization have been established, one referring to the Factors and the other one to the Perceived Learning.

The Factors category has been carried out by means of an inductive analysis, that is based on the content of the answers given by the participants that resulted in subcategories such as Difficulties, Resources and Supports, Positive Emotions, and Negative Emotions.

In the category of Perceived Learning, a deductive analysis has been carried out, taking as reference the graduate profile's competences established by Royal Decree 99/2011.

Two researchers carried out the answer categorization individually. After the process of individual categorization, both researchers analyzed and discussed coincidences and differences until reaching consensus.

Results

The eight participants have indicated at the beginning their expectations regarding learning, difficulties, and resources; during the process, the feelings and emotions that they have experienced, difficulties and support, as well as the partial learning. At the end of the doctoral studied, the perceived learning was collected. Table 1 includes a summary of the results.

Below is the information provided by each of the participants in the three stages of the training process is described in detail.

María

Regarding the learning expectations, at the **beginning** of the studies, María expects to develop the BC1 competence, this means that she aspires to reach a systemic understanding of her field of study and master the research methods, as well as to design and conduct a research (BC2).

Already in the beginning of her training, María includes the idea of the social impact of her doctoral dissertation, a learning that is linked to the competence of the doctoral program CB7:

> *"... I will be able to contribute with ideas for possible improvements in the curriculum of the teacher's initial training" (María, i24)*

She also states that she expects to carry out this learning with a team, referring to one of the personal abilities established by the Decree, related to work as a team and independently (HC4).

On an emotional level, she feels fear while being motivated to start her studies. In fact, she considers that *"enthusiasm and desire to learn" (María, i44)* are her strengths.

She is aware that doctoral training will involve both good and difficult moments. The main difficulties expected are related to availability and time management. Among the elements that will facilitate success she mentions perseverance, willpower, and social support—mainly from the dissertation director.

In the **process**, María is aware of the acquisition of learning related to the BC1 competence, such as searching for information and analyzing data, and with BC4, such as interpreting results, as well as working as a team (HC4). The difficulties are solved with the supervision of her director, social support and the motivation she has for her research.

> *"The motivation that I have, the huge support and the feeling of being continuously accompanied in the process". (María, p 46)*

Once the doctoral studies **end**, María considers that she has developed skills related to the BC1 competence, such as *"searching for relevant in-*

Table 1
Results by Participant

Participant	Learning Expectations Beginning	Perceived Learning Process	Perceived Learning End	Difficulties/ Weak areas	Support/ Strenghts
María	BC1, BC2, BC7, HC4	BC1, BC4, HC4	BC1, BC4, BC5	Time	Motivation, social support, perseverance, supervision.
Julia	BC1, BC5	BC1	BC1, BC5	Techniques	Self-demanding, planification, motivation, supervision, social support.
Matías	BC1, BC5, BC2 BC3	BC1, HC4, HC5	BC5	Distraction, perfectionism and insecurity.	Background, discipline, perseverance, advising, and tutoring.
Laura	BC1, BC4, BC3, BC6	BC1, BC6, HC5	BC1	Analysis program operation	Self-learning, advising, exchange, and social support.
Juan Carlos	BC1, HC3	BC1	BC2	Topic, writing skills, and language.	Reading, training actions, scientific gatherings, supervision, and publications.
Marta	BC1, BC5, BC6, BC7	HC4	BC1, BC6, BC3, HC1, HC3	Blockage, lack of experience and training, and perfectionism.	Perseverance, technical and psychological support, and supervision.
Mónica	BC1	BC1, BC4 HC5	BC1, BC2, BC4, HC1, HC2, HC4, HC5, HC6	Perseverance, no progress, and lack of training.	Seminars, supervision, and social support.
Eduardo	HC4	BC1, HC4	BC1, HC4	Time (reflection) and lack of training.	Self-learning, perseverance, supervision, social support, and training actions.

formation on a subject in databases," "qualitative analysis;" the BC2 competence, referred to the ability to design an investigation; and to the BC5 competence, related to the communication capacity with the scientific community, through the *"publication of papers."*

Julia

Julia **begins** the doctoral program with high expectations for learning, linked to the development of the BC1 and BC5 competences.

She anticipates difficulties related to technical aspects of the research methodology, an aspect that she values as weak in her background. She hopes to overcome them by asking for help and through independent reading. Among her strengths to achieve success, she mentions motivation to learn, discipline and order, rigorosity, and the ability to plan. She perceives that this training

will be intertwined with her personal life and various emotional aspects. In addition, the doctoral student highlights the need for the support of her dissertation director and other scholars when she deems it necessary.

During the **process**, Julia is aware of the great learning she is obtaining, mainly in the BC1 competence:

> *"EVERYTHING!! how to research, the reason behind research" (Julia, p 37-39)*

This learning process goes through emotional ups and downs. She has confirmed her technical limitations due to her limited research background, which she tries to solve through training and interactions with her team members and tutor.

> *"Many difficulties, not having a research background makes you limited to understand and solve things (…) My teammates and my dissertation director*

help me solve them, also attending trainings". (Julia, p 42-43)

After **finishing** the doctoral training, Julia points out that the knowledge acquired is related to the BC1 competence, as well as to teaching, which could be linked to the BC5 competence.

Matías

The learning expectations of Matías at the **beginning** of the doctoral studies include knowledge related to the BC1 and BC5 competences. He mentions the production of a rigorous project (BC2) and originality (BC3).

"... to organize my ideas in a research project that is scientifically sound, academically rigorous and a little bit original". (Matías, i38-40)

Among the difficulties that he expects to meet the expectations, he mentions the lack of academic and research methodology training. Additionally, he mentions the need for a convergence between his academic interests and the dissertation. On the other hand, he mentions his concerns about the funding for doctoral research.

"... that there is not much divergence between my academic interests and dissertation research. Economic difficulties: having enough funding (Matías, i48-49)

On a personal level, he states that he can become too perfectionist, which leads him to feel insecure and dissatisfied with the result. Likewise, he anticipates difficulties to follow the agreed project, since he comes up with many ideas that distract him.

Despite this, he recognizes facilitators that can help him complete the doctoral work, such as the tutoring and advising of scholars, the ability to read and write, and his previous experience in research, as well as discipline and perseverance.

During the **process** he considers that he is learning methodology, learning related to the BC1 competence, besides learning to teamwork (HC4) and writing and disseminating his findings in scientific publications and meetings (BC5).

"To know better all the different aspects of a research. To work as a team and share (methodological, practical, among other) concerns. To discover the world of congresses, publications (...) To write... to

communicate it to others" (Matías, p35-39)

The main difficulty Matías has not overcome is the lack of time dedicated to the doctoral dissertation, both for personal and professional reasons.

At the **end** of his doctoral dissertation, Matías acknowledges having learned all about academic writing (BC5).

"... especially academic writing, to produce a text in a specific genre such as a doctoral dissertation". (Matías, f34)

Laura

At the **beginning** of her doctoral studies, Laura expects to learn knowledge related to BC1 and BC2.

"To design, plan, decide, analyze, etc." (Laura, i34)

The purpose is not exactly confirming some hypothesis but to be surprised with the results, expectation that can be related to the BC3 and BC6 competences.

The emotional expectations are mixed, she thinks that this process will lead her to live positive emotions, but that it will be full of setbacks.

"A process of joys and difficulties ... the joy of making progress in a research ... On the other hand, the difficulties or setbacks that ... may arise". (Laura, i36)

The difficulties identified have to do with the research process itself, for example, not taking into account influencing factors that may affect the results or not reach a global vision of the research.

Among the facilitators of the context, she mentions supervision, orientation and teamwork, as well as reading research on the subject. On a personal level, she identifies as strong points to carry out research, meticulousness, planning ability, motivation, and interest.

"Prior reading on research carried out previous in that same field of study, and the power to share knowledge with people who are working on same lines". (Laura, i38)

During the **process**, Laura states that she is acquiring basic skills related to the area of knowledge and to the research process linked to the BC1 competence. Additionally, she values the importance of knowledge transfer—which can be related to BC6—and multidisciplinarity, an aspect that is related to HC5.

"... I am broadening my vision with the input obtained from different paradigms and authors. On the other hand, I am learning different techniques and methodologies; and ... the importance of knowledge transfer and multidisciplinarity ..." (Laura, p34)

The most important difficulty that has been found is related to the management of a quantitative information analysis program, due to the lack of prior training in this program. She overcomes this difficulty asking for advice and through self-learning, by reading manuals.

The facilitators mentioned in the process are social support of people who are in a similar situation, the training actions, and the seminars where they exchange ideas and suggestions.

Once the process **ends**, Laura mentions that she has developed skills and knowledge specific to research (BC1).

"On one side, to develop necessary skills in research training; on the other side, to expand my knowledge on the subject studied". (Laura, f32)

Juan Carlos

At the **beginning** of the doctoral studies, Juan Carlos expects to obtain learning related to BC1, such as acquiring tools to carry out the research proposal. Likewise, he expects to learn knowledge, innovation and research management (HC3).

In these initial moments, his main concern is the topic's approval he proposes to do research on. To overcome this difficulty, he is aware of the need for a good foundation and theoretical base.

"... I will base the project on the historical background of the problems". (Juan Carlos, i40)

The facilitators which he counts on are faculty, the tutor and full-time involvement.

Throughout the **process**, he considers that he is learning the skills and knowledge related to research (BC1).

"... research processes in different contexts, as well as analyzing instruments from a quantitative perspective". (Juan Carlos, p36)

The most important difficulty at this time is related to writing, a difficulty that tries to overcome through scientific texts reading. Other facilitators of the learning process are:

"The advice of the dissertation directors, scientific reading, academic courses; the exchange in seminars, participation in congresses, and publication in a scientific journal". (Juan Carlos, p40-42)

At this time the doctoral student has the feeling that the dissertation is the center of his world, which allows him to progress successfully on this long road.

"... it is becoming my life ... the complete commitment ... is facilitating carrying it out ..." (Juan Carlos, p40-42)

At the **end** of the training, Juan Carlos claims that he has learned to carry out a research (BC2) and to be a researcher, which is linked to the acquisition of identity as a researcher, a process that involves the development of various competences of the graduate profile.

Marta

Marta's learning expectations at the **beginning** of her doctoral studies are not only related to research skills (BC1), but also, she hopes to learn skills to interact in the academic world. Although this statement may be related to several competences in the graduation profile, it is more specifically linked to BC5 and BC6.

"How to research, what is research, how to make the most of information sources and data, how to publish and where, learn where to search, methodology ..." (Marta i34)

On an emotional level, Marta's expectations are quite negative. She considers that the process will be hard, lonely and long, in which perseverance will be necessary focusing in a higher quality for the research (BC7).

"Hard and lonely. A lot of time ahead and one has to be constant. The quality of research results depends on the persistence of the doctoral student". (Marta, i36)

Among the expected difficulties, Marta considers that the doctoral program entails a lot of work and expects to have blockages, due to lack of experience.

To overcome these difficulties, the doctoral student will have the supervision and guidance of her director and other experts. On a personal level, she values motivation as a fundamental element to keep moving forward.

"In those blockages (...) there are times when it is necessary to have an expert to guide you (...) At this point, the motivation level is crucial." (Marta, i40)

During the **process**, Marta points out learnings related to the competence to learn that will allow her to become a good researcher (HC4), a perception that is linked to the development of research identity.

The difficulties encountered have to do mainly with the lack of research training (tools and information analysis programs). She faces these difficulties independently, seeking help on the Internet, and with the support of team members and the direction.

In the emotional part, she considers that the process is enlightening but also lonely. During the training, she thinks that she is becoming more perfectionist, which leads her to not being satisfied her achievements. However, she values positively the technical and social support she has.

"The psychological support of those who have been by my side, both at work and at home, have been key pieces to overcome the emotional difficulties that have arisen during the research." (Marta, p40)

At the **end** of the doctoral studies, Marta considers that she has learned a lot, both in knowledge on the subject and research skills (BC1, BC6), and more cross-cutting aspects (BC3, HC1, HC3):

"... research methodology, digital resources, how scientific journals work, application techniques for my research, (...) and (...) to organize myself, to have resources for problems that arise during research, time management, resource management, ideas production, (...)": And many others related to the subject of my work." (Marta, f34)

Mónica

Mónica **begins** her doctoral studies with the expectation of acquiring knowledge related to the research process (BC1). The doctoral student considers that it is a complex process and with great difficulties to overcome, at the same time that it is rewarding, where progress is made gradually.

"I think it is going to be a hard process, with difficulties and obstacles, but also rewarding

and ... enlighting. (...) ... it will be like that, with ups and downs, with many doubts and with small steps that will gradually take shape in a meaningful unit". (Monica, i39)

Among her points of improvement, she mentions the need to work independently and with good planning:

"... it is very important to have good organization, establish objectives and short-term deadlines: plan the progress of the dissertation." (Mónica, i43-44)

She identifies several process facilitators, some are organizational and others, social:

"... the support of my tutor and the research team is crucial ... The support of my family and friends is also essential ... it is very important to have people who you can tell them how you are going and the difficulties ..." (Mónica, i43-44)

During the **process**, Mónica earns learnings related to research and the knowledge area, such as methodology, sociology, and statistics (BC1). However, she is aware of other learnings that she has developed during the process such as criteria-based decision-making, ability to summarize, inference of results (BC4), while being aware of the open and dynamic nature of research (HC5).

For Mónica, the process is proving hard and rewarding at the same time, she feels lost in some moments, while in others she goes in the desired direction. All this leads her to feel both frustration and loneliness, and satisfaction when there is progress.

"Hard when you feel lost ... because sometimes you feel lonely and frustrated because things do not go as you expected. However, you learn to face adversity and seek justified and rational solutions. By working, consulting different sources, (...) progress is made. It is rewarding when you are going in the desired direction." (Mónica, p36)

The difficulties have to do with the lack of knowledge on some topics and o on methodology (information analysis programs), for which reading has been crucial, as well as the help of the tutor and the peers. In addition, she mentions other process facilitators such as the research team's seminars, where they present and share experien-

ces, and personal qualities such as perseverance, serenity, and strength.

At the **end** of her doctoral training, Mónica is aware of having achieved different types of learning linked to the BC1 and BC2 competences. She claims to have developed a research identity, which, in her opinion, includes—in addition to the acquisition of specific skills linked to research—awareness of the reality's complexity, flexibility, the ability to reflect, criteria-based decision-making and continuous learning; acquisitions that can be linked with thes BC4, HC1, HC2, HC4, HC5, and HC6 competences.

> *"... I have understood the reality's complexity, and the need to be flexible and open, I have acquired greater capacity for reflection, I have come to known different methodologies and research techniques, (...) In this path, I have been acquiring knowledge and skills to make decisions with criteria and deal with the difficulties ... I have understood that this is a continuous learning process and that it is only the base where I will have to continue working and learning in the future as a researcher."*
> *(Mónica, f34)*

Eduardo

At the **beginning** of the doctoral program, Eduardo expects the process to be stimulating and allows him to acquire tools for his professional and academic development (HC4).

The doctoral student is very motivated, therefore, he expects a rewarding journey, although not an easy one, with difficulties mainly related to the research's technical aspects. However, he recognizes that he has features that will help him overcome obstacles:

> *"Individual work, the instructions of courses and seminars of the doctoral program, the tutor's help ..." (Eduardo, i39)*

During the **process**, Eduardo confirms that the doctoral training is very enlighting, since he is learning many things, such as research skills (BC1) and other skills related to self-learning (HC4):

> *"... I am learning to improve my time management and use of time; I am improving my organization and order when I'm working. On the other hand, regarding*

> *the contents, I am receiving training in aspects related to the research field ..."*
> *(Eduardo, i39)*

Among the difficulties, he mentions that sometimes he has insufficient time to reflect, since the process is going too fast. Other difficulties that he is experiencing have to do with his little training in research methodologies. To overcome them, he has doctoral courses and other training activities, as well as reading and advising from the director and other experts, in addition to the social support of his peers.

> *"Sharing an office with colleagues immersed in the same process has helped me a lot, since you can learn from them ... have their support, (...) I have had the most difficulties in methodology and result analysis. At this point I have gone to experts, as well as to reading, the tutor and peers." (Eduardo, p39)*

When the dissertation **ends**, Eduardo recognizes having learned both from the area of knowledge and research methodology (BC1). He highlights other lessons that have to do with a change of identity, which implies an attitude and behavioral change (HC4):

> *"... it forces you to be persistent, dedicated, methodical (...). On a conceptual level, I believe that the immersion in the field, especially in the methodology, has been very deep ... immersion has been very important too in the area of knowledge. But I would like to emphasize, in addition to it, the attitude." (Eduardo, f31-32)*

Discussion

In this research, the doctoral training process has been analyzed from the information gathered at different moments of the process. The discussion is organized around the two main areas: learning and factors, both as facilitators and obstacles of the process.

Learning

The expectations of all participants are focused on the development of competences for research, related to technique and tool management and to going further in their area of knowledge (BC1).

They consider having achieved this learning at the end of the doctoral studies, which can be considered a success for the programs. In fact, during the doctoral studies one learns to research, designing and developing a research, which foster other learnings. The validity of research-based learning in doctoral training is confirmed (Villardón-Gallego, 2015).

Learning related to other competences included in the doctoral studies' graduate profile is not perceived by the participants in the same exact way. Thus, three students mention having making progress in the ability to communicate within the scientific community, through writing papers and presentations in forums and scientific meetings (BC5); two of them, Matías and Julia, indicated this at the beginning as an expected learning.

There are also three students who consider having learned to design and develop a research project (BC2). Only one student, Marta, mentions the acquisition of the ability to promote advances in the knowledge society (BC6), learning that she had stated in her initial expectations. In the same line, she declares to have developed skills to contribute in bringing knowledge forward departing from an original investigation (BC3). It is worrying that only one participant perceives this achievement, since doctoral training must enable them to improve society by producing and transferring new knowledge (Baptista, Frick, Holley, Remmik & Tesch, 2015).

Finally, Mónica is the only student who acknowledges having achieved learnings related to critical analysis, evaluation and synthesis of new and complex ideas (BC4), which she has already learned during the training process.

The perception of learning related to the acquisition of personal skills and abilities is even less frequent at the end of the doctoral program. Two students, Eduardo and Mónica, acknowledge having learned to work both as a team and independently (HC4), a learning that was among the learning expectations of Eduardo and with which he already perceived improvement during the process. Mónica also recognizes learnings related to other skills included in HC1, HC2, HC5 and HC6, some of which she had already mentioned during the process.

These results show that the participating students—when they finish their doctoral studies—

are not aware of having developed many of the learnings related to basic competences identified as educational goals by the Decree and that correspond to transversal competences, dispositions, behaviors and meta-competences, in words of Durette et al. (2014). It cannot be said that they have not acquired such learning to a greater or lesser extent, but they seem to not be aware of it, which could be related to perceptions of their research (Álvarez-Álvarez, Elexpuru, Castelló, Villardón-Gallego & Yániz, 2017). Given that awareness of their own abilities is important for their performance (Lunenburg, 2011), it is considered essential for doctoral programs to work in this direction.

According to the information gathered, it seems that the initial learning expectations affect the perception of learning at the end; in other words, those students who expect to learn certain skills are more aware of having achieved them. These results match with those obtained by Combs & Onwuegbuzie (2012) regarding a doctoral course on statistics. Additionally, learning obtained during the process is related to the learning obtained at the end. For this reason, it is recommended that programs design specific activities of shared reflection to make their students aware that the doctoral training produces a highly qualified performance, not only in terms of research techniques but also in relation to contribution for knowledge, improvement of society, innovation capacity, etc. These activities are a tool for the development of transverse competences, behaviors, and attitudes of the researchers. In this way, it would be possible to improve the performance of new doctoral researchers by developing during the training process their research identity from a broad concept, as a contribution to society and knowledge, and as personal development.

It should be noted that having the information collected through open-ended questions may have produced an effect in not having a greater number of perceived learning. However, it is considered that this type of question allows a more accurately gathering of their awareness regarding the learning obtained, since no suggestion of a possible answer is included.

On the other hand, in the result interpretation, one must be aware that in the competences and

abilities included in the Decree that regulates doctoral training there is a certain unavoidable overlap, which makes it difficult to follow an exclusionary categorization of the students' answers regarding perceived learning.

Factors

The results validate the importance of the tutor during the doctoral process, as much as for the technical supervision as for the social support, since all participants refer to them as a resource to overcome difficulties. Consequently, both the synchrony between tutor and student, and the supervision based on the needs of students (De Kleijn, Meijer, Brekelmans & Pilot, 2015),that establishes an open and negotiator communication providing continuous assistance to competence development and career opportunities are essential elements in doctoral training (Duke & Denicolo, 2017).

Therefore, it is necessary that the tutors are highly qualified to carry out a quality supervision and guidance. For this purpose, it is suggested that they participate in training activities and gatherings that enhance their commitment to their professional development, continuously improving their supervisory competences (Duke & Denicolo, 2017).

Additionally, in accordance with other researchers (Gardner, Jansujwicz, Hutchins, Cline & Levesque, 2012; Spaulding & Rockinson-Szapkiw, 2012), the importance of social support is confirmed by both doctoral peers, and family and friends. In fact, social support and the search for help are among coping strategies that facilitate learning (Combs & Onwuegbuzie, 2012) and decrease burnout and dropping out (Peltonen et al., 2017). Therefore, it is suggested to include in doctoral programs training actions and spaces that favor experience exchange, to encourage the creation of learning communities among researchers.

Students value positively the training activities carried out within the programs, both specific courses on different techniques and research methodologies, as well as the participation in scientific meetings and publications, which—just as the completion of the doctoral dissertation—offer the opportunity to actively learn from the experience under the guidance and supervision of the tutor.

On the other hand, readings are a fundamental resource in a self-learning process.

Leech's model (2012) considers important certain personal features in the training of researchers in education. In this same line, seven participants mark perseverance and *"self-demand,"* six of them mention it as a quality, and one participant, Mónica, as an aspect she has to improve. In addition, two students mention motivation as an important variable for success in their studies.

On the contrary, perfectionism is recognized by two participants as a barrier, as it leads them to feel insecure about what they are doing and, therefore, leads them to blockage. For another student, distraction is a difficulty that prevents him from focusing on his research.

The most commonly perceived difficulty in this researcher group is the lack of training and prior knowledge in research methods and techniques, and academic writing and language. Therefore, the training activities focused on methodologies, techniques, and research tools are essential to develop instrumental competences necessary for carrying out the doctoral dissertation and to complete future research.

Regarding the emotional dimension, participants are aware of the presence of positive and negative emotions during the doctoral program, depending on progress or blockages, validating what was found in other investigations (Coterall, 2013; McLaughlin, 2003). It is important for researchers in training to become aware of their emotions and how they affect learning, as a first step to self-control (Villardón-Gallego & Yániz, 2014).

Ultimately, during the doctoral process, students begin to develop their research identity (McAlpine & Lucas, 2011), which means having acquired skills related to research, independent work, and team work, as well as improving values and attitudes related to rigor, social commitment and research ethics. Additionally, as part of this identity, researchers must become aware of being part of the scientific community (Castelló et al., 2015; McAlpine and Amundsen, 2009), which implies active contribution to knowledge development and its transfer for improving society (Reale et al, 2017). For that purpose, it is crucial for them to be part of a research team and participate

in publications, and scientific and dissemination meetings.

This research has allowed to understand the aspects that surround the competence development of doctoral training through the reflections throughout the process of eight researchers, that successfully finished their studies, to propose improvement suggestions based on the results. Nevertheless, it would be interesting to explore and analyze the process in those students who did not finished their training, to know the causes of failure and design measures to reduce them.

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