

## **Online Master Degrees - the MISE Case Study**

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Thesis to obtain the Master of Science Degree in  
**Information Systems and Computer Engineering**

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*“It is hard to fail, but it is worse never to have tried to succeed.”*

— **Theodore Roosevelt**



# Abstract

The Master's Degree in Information and Enterprise Systems (MISE) is an increasingly popular master's degree, both in Portugal and in Portuguese-speaking countries. However, there are some barriers that could lead to the end of this master's degree, but so far twenty-five percent have already been finished. Therefore, some barriers have prevented this aspect. Using the Case Study Research Methodology (CSRM), we propose to answer a number of research questions to find evidence, facts and answers for those low concluded rates. We will perform the research questions, based on sixty-one interviews and surveys with the students of the five editions of MISE. From the results obtained, we identified some of the main barriers to the students of MISE. One of those barriers is that there is no referential to know how the other master's students are doing, seeing that it is completely autonomous work.

## Keywords

Distance learning; distance education; teaching online; master's; E-learning; University.





# Resumo

O MISE é um mestrado cada vez mais popular, tanto em Portugal como nos países de língua portuguesa. No entanto, existem algumas barreiras que levam ao fim deste mestrado, no entanto até agora, vinte e cinco por cento, já terminaram. Por isso, algumas barreiras impediram esse aspecto. Usando o CSRM, nós propomos a responder uma série de questões de pesquisa, a fim de encontrar evidências, factos e respostas a essas baixas taxas de conclusão. Vamos realizar as questões de pesquisa com base em sessenta e uma entrevistas e questionários feitos com os alunos das cinco edições do MISE. A partir dos resultados obtidos, identificámos algumas das principais barreiras. Uma dessas barreiras é que não há referencial para saber como vão os outros alunos do mestrado, por ser um trabalho completamente autónomo.

## Palavras Chave

Ensino a distância; educação; ensino *online*; mestrado; *E-learning*; Universidade.



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# Acronyms

<b>ACM</b>	Association for Computing Machinery
<b>A3ES</b>	Agency for the Evaluation and Accreditation of Higher Education
<b>BMC</b>	Business Model Canvas
<b>CBI</b>	IEEE Conference on Business Informatics
<b>CISTI</b>	Iberian Conference on Information Systems and Technologies
<b>COOCs</b>	Corporate Open Online Courses
<b>CSRM</b>	Case Study Research Methodology
<b>DE</b>	Distance Education
<b>ECTS</b>	European Credit Transfer System
<b>ETA</b>	Enterprise Technological Architectures
<b>EU</b>	European Union
<b>E-learning</b>	Electronic Learning
<b>FG</b>	Focus Group
<b>iLRN</b>	Immersive Learning Research Network
<b>IST</b>	<i>Instituto Superior Técnico</i>
<b>KMS</b>	Knowledge Management System
<b>LMS</b>	Learning Management System
<b>MEIC-A</b>	Master's Degree in Bologna in Information and Software Engineering - Alameda
<b>MEIC-T</b>	Master's Degree in Bologna in Information and Software Engineering - Taguspark



<b>MEIC</b>	Master's Degree in Bologna in Information and Software Engineering
<b>METI</b>	Master's Degree in Bologna in Telecommunications Engineering and Computer Science
<b>MISE</b>	Master's Degree in Information and Enterprise Systems
<b>MOOCs</b>	Massive Open Online Courses
<b>OAIS</b>	Organisational Architecture of Information Systems
<b>PALOP</b>	African Countries of Portuguese Official Language
<b>RM</b>	Research Methodologies
<b>SMOCs</b>	Synchronous Massive Online Courses
<b>SPOCs</b>	Small Private Open Online Courses
<b>SSOCs</b>	Synchronous Small Online Courses
<b>UAb</b>	<i>Universidade Aberta</i>
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organisation
<b>VLE</b>	Virtual Learning Environment



# 1

## Introduction

### Contents

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Teaching has gradually evolved from the most primitive forms of learning to what exists today. It is necessary for education to meet the needs of the student's market. The classroom education is traditional education, education that happens with the personal presence of professors and students. With the advancement of computing and the Internet, online education [12] has emerged. What is expected of the online teaching [12] is that it has a system that offers integrated support to different technologies, offering better functionalities.

Thus, online teaching allows you to streamline and gain more flexibility [13]. These and other benefits have led to a growing dissemination of online teaching. According to the United Nations Educational, Scientific and Cultural Organisation (UNESCO), 'Education is a fundamental human right' [14].

Electronic Learning (E-learning) can be defined as the use of technology in a computer network, mainly in an intranet or via the Internet to provide information and instructions to individuals (in our case, students). And not only as content provider, but there are means of bi-directionally communication [15].

Communication technologies, from the most varied forms of multimedia, be it text, voice, visual and its ability to extend interaction over time and distance, are transforming teaching and learning. The qualities that will be evaluated in a 'knowledge-based future' will be the ability to access and perceive the information made available. Why innovate in higher education? Basically, for the purpose of continuation and because it is part of our mission. In a constantly changing society, institutions are transformed with the society where they are integrated [15].

Distance Education (DE) introduces new ways of learning, without the presence of the student in the classroom. This brings great flexibility to students, especially those who have a professional occupation or are unable to travel geographically. To successfully complete DE, the student must plan, have a great delivery and have some experience in e-learning. In this case, authors such as Shachar and Neumann [16] consider that the concept of DE has progressed 'from an anywhere to any time to any space delivery method' [16].

This study was done with the aim of identifying the obstacles of the DE and in particular of this master's degree (Master's Degree in Information and Enterprise Systems (MISE)). This was created in conjunction with *Universidade Aberta* (UAb) and *Instituto Superior Técnico* (IST), which will be detailed better with the methodology in Section 1.2. That is, the objective of the work is to make a case study about the MISE, the applicability of the same in society and especially what is the value that has in the academic environment.

This master's degree was mainly done to train professionals with a solid background and skills in technologies and business systems. Through the functioning of organisations so that they can meet the needs of constant technological innovation in companies and organisations. This distance master's programme allows students to learn and study with greater mobility and flexibility.

The present work is inserted in the context of a case study investigation on the MISE, and it is

intended to understand its limitations and on the other hand, its greater valences [6]. In this work, we will use the Case Study Research Methodology (CSRM) [2], which will be discussed in more detail in Section 1.2. In the next Chapter 2, we will present the background to this case study.

This document is structured as follows. In the Section 1.1, an introduction is made and then the context of the subject is mentioned and still within this structure the objectives of the investigation of this case study are discussed. In the Chapter 2, the related work on the topics of this research is described. Section 1.3 looks at which questions should be answered after this study is concluded. In the Chapter 3 presents the various research methods used in this work.

Section 3.2 discusses the various techniques used in this work. Chapter 4 shows where the data of this study is presented and later its analysis appears in Chapter 5. Finally, Chapter 6 will present the main conclusions, limitations and future work. In Section 6.4, we are told how to communicate our work to the scientific community. Finally, a section is presented with references and appendixes.

## 1.1 Context and Motivation

Nowadays, with the digital age, the media has become easier and simpler, without leaving home. In this way, it is possible to obtain certificates and studies with greater ease. The DE has some limitations, mainly highlighting the difficulty of evaluating students at a distance [17]. However, DE also has many advantage [18]. The lower cost of distance learning is also benefit for students.

Regarding the 2012 Association for Computing Machinery (ACM) Computing Classification System, which has served as the fact standard classification system for the computing field. We found that there is a branch within the classification of existing areas in the ACM, which in turn within the area of applied computing has the area of education.

Within the area of education, there are some areas that fit the environment in which case study was carried out. As is the case in the area of education that contains digital libraries and archives, computer-assisted instruction, interactive learning environments, collaborative learning, learning management systems, distance learning, e-learning and computer-managed instruction.

This study was done to identify the obstacles of the DE and in particular, the MISE. This was created in partnership with UAb and IST of the *Universidade Técnica* of Lisbon, which will be detailed in Section 3.1. That is, the objective of this dissertation is to make a case study of MISE, the applicability of the same in society and especially the value that it has in the academic environment.

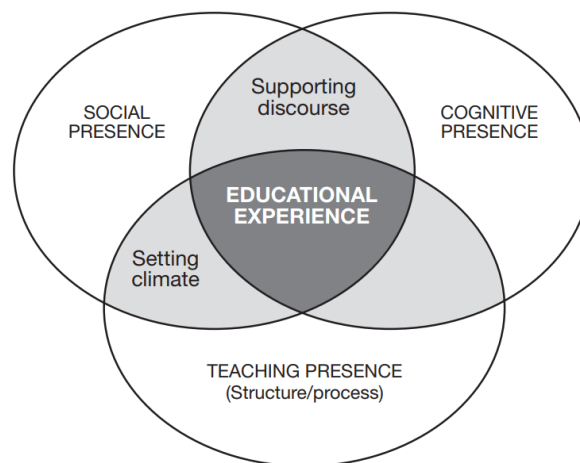
This master's degree was mainly done to train professionals with solid backgrounds and skills in technology and business systems. Through the functioning of organisations so that they can meet the needs of constant technological innovation in companies and organisations. This distance master's programme allows students to learn and study with greater mobility and flexibility.

The extended synchronous discussions have been advantageous to the distance model. Consequently, we can record, whether in forums or in a video, in discussions, which one becomes more difficult in the classroom model. It presents a lower persistence than happens in each instance or class. Some critical factors that affect learners' satisfaction are motivating aims, cognitive modes, and interpersonal behaviours [19], perceived usefulness and perceived ease of use [20] and perceived flexibility [12], interaction with class participants, student usage, and gender [21]. How the student is evaluated is still one of the main problems in DE [17].

On the other hand, the lower cost for distance learning is also attracting interest or attention of students [18].

Besides that, we also have so many advantages of distance learning, such as, the ability to save a student's time, support from colleagues, management support of the specific innovation, [22] perceived usefulness, an attitude towards e-learning, program flexibility, clear direction, course quality, learner Internet self-efficacy, [23] diversity in assessment, learner perceived interaction with others and finally, perceived e-learner satisfaction [24].

We can highlight the most relevant factors for face-to-face teaching according to Garrison and Terry Anderson [1]. In Figure 1.1 withdrawal from 'E-Learning in the 21<sup>st</sup> Century' [1] shows us the main factors related to the educational experience.



**Figure 1.1:** Means of communication using educational experience (from [1])

The social presence is a paradigm since some researchers persist in the relevance of this pattern [25]. This paradigm enhances students' academic success demonstrated in the relationships that are created between student-student and between student-professor. What ultimately creates and increases satisfaction for the student and further expands the development among students to answer questions in the community [25].

Some suggestions for improving social presence include having opportunities for the student and the

professor within the learning process, using a collaborative framework and interactive learning activities [17]. It goes a long way in using group work strategies, to have a professor/instructor ask a lot of questions and introducing dynamics into a forum to create a discussion within the group, and when appropriate, to provide feedback. Still, other proposals are to call the student by name and encourage students to share their experiences and stories [25].

As explained earlier by [22], we can understand that not only are there some limitations and impediments but there are also many other benefits that come from it. The use of computers and computer networks unites professor, learners and carry the content of the course. The provision of a two-way communication via computer networks can benefit the student or even initiate dialogue (this distinguishes it from other uses of technology in education) [26].

The present work is inserted in the context of a case study investigation on the MISE, and it is intended to understand its limitations and on the other hand, its greater valences [6]. In this work we will use the research method case study [2], which will be discussed in more detail in Section 1.2.

## 1.2 Research Methodology

This research follows the CSRM. Above all, when the boundaries between phenomenon and context are not crystal clear. In the research methodology of this case study, multiple sources of credibility are used [2]. This methodology is determined by Yin as an 'empirical inquiry that investigates a contemporary phenomenon within its real-life context' [2].

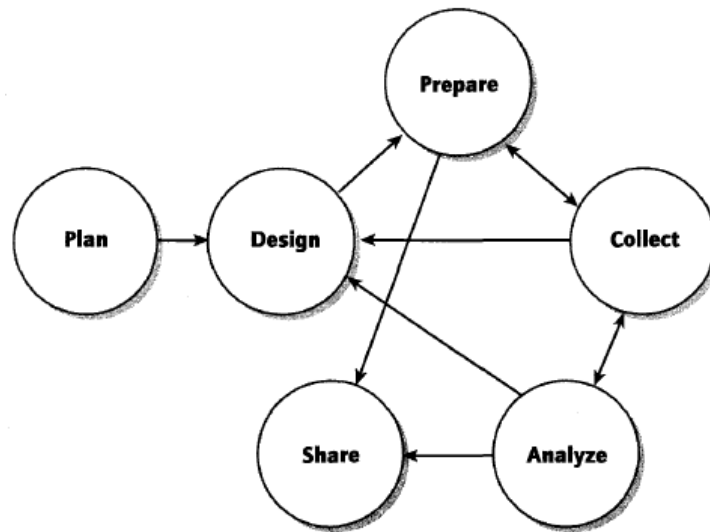
Since the main feature of a case study is scientifically supported, its evidence base is for professional applications. Case studies of individuals in research involve in-depth interviews with participants and key people, review of interviewee records, observations, and excerpts from their personal manuscripts.

The investigation of a case study stands out by leading us to an understanding of a more complex issue or object. It can extend the experience or increase the consistency of what is already known through previous investigations. The case studies emphasise the detailed contextual analysis of a limited number of events or conditions and their relationships. Researchers have used this Case Study Research Methodology for many years within a variety of subjects. Figure 1.2 taken from *Case study research: design and methods* [2] shows us how to carry out an investigation in a case study.

Several researchers continue to use the case study research method and are able to obtain successful results in carefully-planned studies through real-life problems. There are several reports on case study research across subjects that are available in the literature.

Another methodology that is also based on the opinion of a group of people is the Delphi [27] method. In this method, the actors must be specialists. People who have sufficient knowledge of the area and skills in a given field of study and with reasonable experience in the field. So MISE students alone are





**Figure 1.2:** Several steps to investigate a case study (from [2])

not experts. This can only be the case if it were to reach a consensus, for example, the reasons for MISE students to give up the course and/or thesis.

Researcher Robert K. Yin defines the case study investigation method as an empirical inquiry that investigates a contemporary phenomenon in its real-life context. When the boundaries between phenomenon and context are not visibly clear, as in a case study, multiple sources of credibility are used [2].

Several authors among Robert K. Yin et al. propose this investigation case study, [2]. The study consists of six steps that should be used:

1. Determine and define research questions;
2. Select cases and determine data collection and analysis techniques;
3. Prepare the data collection;
4. Collecting data in the field;
5. Evaluate and analyse data;
6. Prepare the report.

The case studies are complex because they usually involve numerous data sources, they can include multiple cases within a study, and produce large amounts of data for analysis. Researchers of many subjects use the case study method to build on theory, to produce a new theory, to dispute or challenge a theory, to explain a situation, to provide a basis for applying solutions to situations and to explore or describe an object or phenomenon [28].

The advantages of the case study method are its applicability to real life, the use of contemporary human situations and its public accessibility through written reports. The results of the case study relate directly to the everyday experience of the average reader and facilitate the understanding of complex real-life situations.

The techniques used in this case study were as follows; interviews, concept maps, survey and focus groups. The use of several methods increases the reliability of this case study. Interviews as a qualitative method to collect data are universally used in this methodology. CSRM 'provides in-depth information pertaining to participants' experiences and viewpoints of a particular topic' [11]. 'Case studies tend mostly to be based on qualitative data, as this data provides a richer and deeper description' [11].

According to Donald R. and Schindler et al., the order in which a case study investigation is to be processed is shown in the Figure A.1 in the Appendix A [6].

### **1.2.1 Step 1 - Determine and define research questions**

The first step in investigating the study is for the investigator to focus on a firm investigation. That is, the researcher can refer to the study of a complex phenomenon or object. The investigator establishes the focus of the study by asking questions about the situation or problem being studied and determines a purpose for the study. The object of the investigation of a case study is often a project, an entity, a person or a group of people.

Each subject is likely to be intrinsically linked to political, social, historical, and personal issues, giving ample scope for questioning, which increases the degree of complexity of case study research. The researcher looks into the subject in depth using a variety of data collection methods to generate certainties that lead to the perception of the study and reflects on the research questions. Researching a case study commonly responds to one or more questions that begin with 'how' or 'why'.

### **1.2.2 Step 2 - Select cases and determine data collection and analysis techniques**

During the design phase of investigating a case study, the investigator determines which approaches to use in the selection of real-life cases. And what methods of data collection and tools to use. By using multiple cases, each case is treated as a single case. The conclusion of each case can be used as information that contributes to the whole study. However, each case remains a unique case. The cautious separation in the division of the materials that are to be selected is a fundamental point to be able to raise limits around the case.

The investigator determines whether to study cases that are considered unique or that are considered typical and can also select cases to represent a variety of geographic regions, a variety of size

parameters or other parameters. A useful step in the selection process is to repeatedly resubmit the purpose of the study to focus attention on where to look for cases and evidence that meet the purpose of the study and answer the research questions raised.

Selecting multiple or unique cases is a key element. This is because a case study may include more than one embedded analysis. For example, a case study may involve the study of a single industry and a company that participates in this sector. This type of case study involves two levels of analysis because they are two different entities. In addition, it increases the complexity and quantity of data to be collected and analysed.

Using multiple sources and techniques in the data collection process increases the degree of agreement, generally. The investigator determines in advance which evidence to collect and which analysis techniques to use with the data to answer research questions. The data collected are usually largely qualitative, but can also be quantitative. Data collection tools may include investigations, interviews, and literature reviews.

The investigator shall use the data collection tools assigned in a systematic and appropriate manner in the collection of evidence. During this phase of information gathering, researchers should ensure that the study is well constructed to ensure construct validity, internal validity, external validity, and reliability. The validity of the construction requires that the researcher use the correct measures for the concepts under study.

Internal validity (especially important with explanatory or causal studies) shows that certain situations lead to other circumstances and require the use of multiple evidence from multiple sources to uncover convergent lines of inquiry. The external validity is reflected in the results that are generalisable or not. That is, a case study undergoes variations across locations, people and procedures, and yet it still manages to deliver the same results.

Several techniques such as literature review help to ensure external validity. Reliability refers to the stability and accuracy of the measurement. The exemplary case study design ensures that the procedures used are well documented and can be repeated with the same results, as necessary.

### **1.2.3 Step 3 - Prepare the data collection**

One of the great difficulties is the collection of data. This is because collecting data generates large amounts of data from multiple sources, systematic organisation of data is critical to prevent the researcher from becoming overwhelmed with the amount of data and prevent the researcher from losing sight of the original purpose and research questions. Advanced preparation helps you deal with large amounts of data in a documented and systematic way.

Researchers prepare databases to help categorise, classify, store and retrieve data for analysis. In the latter case, when the amounts of data are extremely large.

#### **1.2.4 Step 4 - Collect data in field**

The researcher must collect, go through and store vast sources of evidence in a comprehensive and organised way, in formats that can be referenced and ordered to later achieve convergences of surveys and standards. Renegotiation of corrections to study objects or addition of interview questions may be necessary as the study progresses. The investigation of a case study is flexible, but when changes are made, they are documented systematically.

Exemplary case studies use field notes and a database to categorise and reference data so that it's readily available for subsequent reinterpretation. Field notes record feelings and intuitions that raise questions and thus improve work documentation. It is important to record testimonials, stories and illustrations that can be used in subsequent reports. Being in the data collection in the field will always be possible due to the detailed exposure of the intervener giving an early signal that a pattern is emerging.

In this way, they help determine whether or not the survey needs to be reformulated or redefined based on what can be observed by the interviews, by people's reactions. This is one of the reasons that field notes should be kept separate from the data collected and stored for analysis.

The management of the relationship between the question and the evidence must be mandatory. The investigator must document, classify, and do a cross-reference of all the evidence, whenever possible. So that this information can be acquired in a useful and efficient way later.

#### **1.2.5 Step 5 - Evaluate and analyse the data**

The researcher grossly examines data using various interpretations to find links between the subject of research and the results with reference to the original research questions. Throughout the process of evaluation and analysis, the researcher remains open to new links and new directions. The case study method through the use of extensive data collection methods and analysis techniques gives researchers the opportunity to triangulate data to strengthen the results and conclusions of the research.

In addition to all the analysis that is done and any data processing that is performed, it may still be necessary to perform recurring procedures. Therefore, repeated interviews may be conducted to collect additional data to verify key observations or to verify a previously established fact.

When enough observations converge, confidence in results increases. When there is information that creates conflicts, it implies that it causes investigators to seek more information on the subject. A common technique is a search for patterns. However, researchers cannot jump to conclusions.

#### **1.2.6 Step 6 - Prepare the report**

The preparation of the report should be thorough so that the reader reads, and the latter can question and evaluate the study easily to reach an independent conclusion of the researcher. In spite of this, one

realises that a complex problem has been transformed into another problem that can be understood by the reader. The goal is to use a very simple way, to reach the reader and the public.

Therefore, this impartiality can lead the reader to apply the experience to their own real-life situation. It is necessary to demonstrate a clear evidence to the reader so that they can directly believe and apply the present findings.

The most common techniques include reporting events in chronological order as if it were a story. According to the comments of the groups questioned the researcher rewrites and makes adjustments to the document.

To conclude, a case study is the product of intensive research and an analysis of the phenomenon or social unit. The case studies are particularly descriptive of the phenomenon to be investigated and analysed. The case study offers a meaning of complex social research, consisting of several variables with relative potential and importance to help in understanding the phenomenon [29].

The case study offers a meaning of complex social research, consisting of several variables with relatively potential and importance to help in understanding the phenomenon [29]. This study looks at several questions about the MISE that will be discussed in the section on research questions. In addition, other issues related to the online master's degree are to be noted.

### 1.3 Research Questions

The selected research method above consists of research questions. The first step of the case study research method is precisely to determine and define the research questions. These questions are set out below. However, there is a general question that stands out from all the others. The case study research method does not necessarily have a problem. However, it does involve research questions [30] [6].

The major question that this study seeks to answer is the following:

Is the Master in Information Systems and Business (MISE) a success story?
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In this case study we intend to answer the following main questions about our case study, the MISE master's degree, which will be explained in more detail in Section 3.1:

- How many students are currently enrolled and have graduated?
- What were the criteria for choosing this master's degree?
- Did this master's degree meet the expectations of the students?
- Was it worth attending the residential week?

- How can online distance master's be improved?
- What are the main differences between the three student categories?
- How many scientific publications are generated by online master's degree students?
- How is the completion rate in the online master's degree?

The answers to these research questions, based on the perceptions of the students and not just, provide a different perspective about a case study in online education. The answers to the research questions will be answered throughout the course of the document.

A successful case involves achieving the business purpose of satisfactorily providing your product/service to customers, in this case, the students can be considered a service where the training is offered to the students.

Meet the needs of students, professors and members of the environment and facilitate the production of content for students. In general, it must meet the needs of both students and content providers.

This case study focuses on distance-learning students who are undertaking this online master's degree and whether this master's degree may or may not be considered a success story within online teaching [12] and existing master's. We adopted a qualitative methodology and conducted semi-structured interviews through Skype.

# 2

## Related Work

### Contents

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This section presents a literature review on the topic of online education. We started presenting the topic of distance learning, followed by the topic of E-learning analysis complemented by an analysis of online masters and small courses also run at a distance. To conclude, contributions of five approaches on some derivations of distance learning are presented.

This chapter is very important since it fits into the area and subjects that involve this study. For this very reason, it is necessary to have a comprehensive view undergoing what exists in the literature to achieve for a more solid investigation. MISE is in the area of online masters. And for that reason, we can see through Section 2.4 that there are other masters such as the MISE also they online.

In this chapter, we present a literature review of online teaching. A brief description of E-learning, online masters and even more depth about the only online master's so far are presented.

## 2.1 Distance Learning

There are several conclusions and various definitions of what distance learning is. From the moment the computers got involved and mixed with the education, a proposal of definition appeared. It identified the delivery of instructional materials, using printed and electronic material [31]. The delivery of institutional content includes an instructor/professor, who has been physically in a different place from the learner/s-student. In this way, it is possible to provide content at different times [32]. There is a student-professor and student-student 'communication' component, in addition to network activities that generate content, for example.

Most literature focuses on identifying factors within distance learning such as acceptance/resistance, adoption/barriers. Other agents may arise, such as overwork or institutional or pedagogical problems. Therefore, these aspects still involve the technology used and its performance, time, institutional support, premiums or incentives, and quality of learning and teaching [33].

Bennett indicates that more mature students, in particular, students who already have some type of graduation tend to be better and have better grades in online courses. This is mainly due to the extra individual responsibility required by the online teaching. A delivery of the student is also necessary, a systematic dedication and mainly enough subject in itself [34].

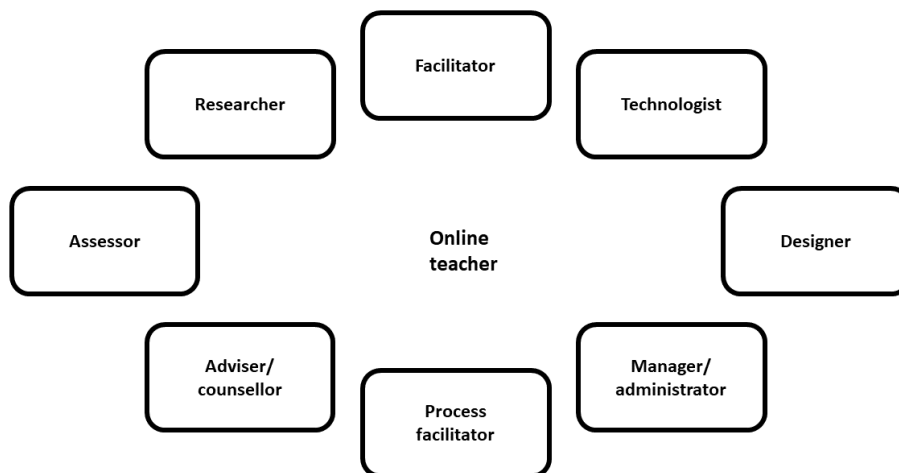
## 2.2 Online Teaching vs. Online Education

Online learning and teaching should be understood against a background of globalisation and 'borderless education' [35]. Major corporations and virtual universities seek to operate in a global context. Consequently, definitions of the competencies involved in effective online teaching need to be expressed in a way that minimises problems of understanding and interpretation across national, linguistic and cul-

tural boundaries. The terms used also should work in the various sectors of education and training: compulsory schooling, university, corporate training, and so forth [36].

We used online teaching and learning to mean teaching and learning that takes place over a computer network of some kind (e.g., an Intranet or the Internet) and in which interaction between people is an important form of support for the learning process. This rules out learning that is purely resource-based for example, learning using some Web-based courseware without recourse to any kind of human interaction. The main roles of an online professor were identified according to several authors (see Figure 2.1). It includes both synchronous and asynchronous forms of interaction as well as interaction through text, video, audio, and in shared virtual worlds.

The terms 'distance education' or 'distance learning' have been applied interchangeably by many different researchers to a great variety of programs, providers, audiences, and media. Its hallmarks are the separation of professor and learner in space and/or time [35], the optional control of learning by the student rather than the distant instructor, and non-contiguous communication between student and professor, mediated by print or some form of technology [17].



**Figure 2.1:** Roles involved in online teaching [3]

Distance education also mentioned, is less a philosophy and more a method of education. Students can study in their own time, at the place of their choice (home, work or learning centre), and without face-to-face contact with a professor. Technology is a critical element of distance education.

Often in an environment with a small closeness between student and professor. The professor plays different roles in addition to teaching and giving materials to students. The professor sometimes feels obliged to be and to perform functions. Figure 2.1 represents the various roles that an online professor can perform.

Teaching online means conducting a course partially or entirely through the Internet. You may also see references to online education as E-learning. It's a form of distance education, a process that traditionally included courses taught by mail, by DVD, or via telephone or TV — any form of learning that doesn't involve the traditional classroom setting in which students and instructor must be in the same place at the same time [36].

## 2.3 E-learning

According to Nichols, e-learning is a bit difficult to realise within a definition. He argues that e-learning must be strictly accessible by using technology-based tools that are based on web-based and text web-distributed [37].

Information technologies will continue to increase in strength as the cost goes down. There are also two main effects on distance learning: the convergence of computers and telecommunications, and the progressively sophisticated growth of technology for teaching.

Benson proposes that e-learning is not only based on methods delivered via CD-ROM or Internet or Intranet. However, it should also include audio, cassettes, satellite via satellite, and interactive television [38]. The learning environment is referred to by a Learning Management System (LMS), a CMS, a Virtual Learning Environment (VLE), or even a *Knowledge Management System (KMS)*.

In this context, the definition of e-learning to be used in this work is any learning experience via the Internet or any other digital format, where e-learning combines technology and pedagogy. What is important is the student's experience in this learning combined with digital platforms. In addition, not all content requires social interaction.

In short, e-learning has changed the way so many students and professors view distance learning and have become a dominant learning paradigm. It is therefore desirable to create interactive, quality content and multimedia content.

## 2.4 Master's online

The online master's requires greater responsibility, autonomy and independence than those who study in person and who interact with others. And these pull at each other, and there is the motivation that is increased because of these occurrences [39]. In theory, the professor only acts as a facilitator or to guide the student in his or her learning. Students need more than regular, face-to-face 'learning to learn' beyond the traditional way of memorising.

To create an online master's it is necessary to collaborate extensively with the faculty to achieve a dignified, yet appealing curriculum. The online master's programmes, including the graduation of this

initiative in distance learning, were outlined and proposed at the end of 1998 by Bernath and Rubin [40].

In-class teaching is divided into two aspects: the first one is about the design of the educational experience, usually by the professor (including selection, organisation, presentation of course content, learning activities, and evaluation). Secondly, the ease of discussion and collaboration about the subjects can be shared among the participants/students and not just between the students and professor [41].

Currently, the Coursera platform already offers four master's degrees online:

- Master's of Business Administration (iMBA);
- Master's of Computer Science in Data Science (MCS-DS);
- Master's of Science in Accountancy (iMSA);
- Master's in Innovation and Entrepreneurship (OMIE).

The University of Illinois, in partnership with Coursera, designed the iMBA, iMSA, and MCS-DS programmes to make quality education accessible and appealing to a wide variety of talents.

The other online master's, the OMIE, specialises in education and management research, given by the HEC Paris University. This offers a complete and unique range of educational programmes for the leaders of the future. HEC Paris is one of Europe's best-ranked business schools. Students admitted to the undergraduate programmes, who complete all undergraduate requirements, will earn upon completing their master's degree, an actual degree from the University of Illinois or HEC Paris.

FutureLearn is a privately-owned company of The Open University, with extensive experience in distance education and online education. This platform has already made available five master's fully online. As is the case of Cyber Security, Development and Humanitarian Action, Nursing, Professional Practice: Information Technology, and lastly Professional Practice: Leadership. All the master's online are in partnership with the University of Deakin, except for the Master's in Nursing that is presented by the University of Coventry.

To conclude, Georgia Tech and Udacity created the Online Master of Science in Computer Science (OMSCS) was the first master's degree announced by a provider of MOOCs. Later, a new partnership was formed between Georgia Tech and edX, the Online Master's of Science in Analytics. Both titles that are released today are from world-renowned universities. Cost is often the biggest obstacle to a master's degree. The online degree can be offered more affordable than the equivalent master's on campus, without sacrificing academic rigour or educational quality.

## **2.5 Massive Open Online Courses (MOOCs)**

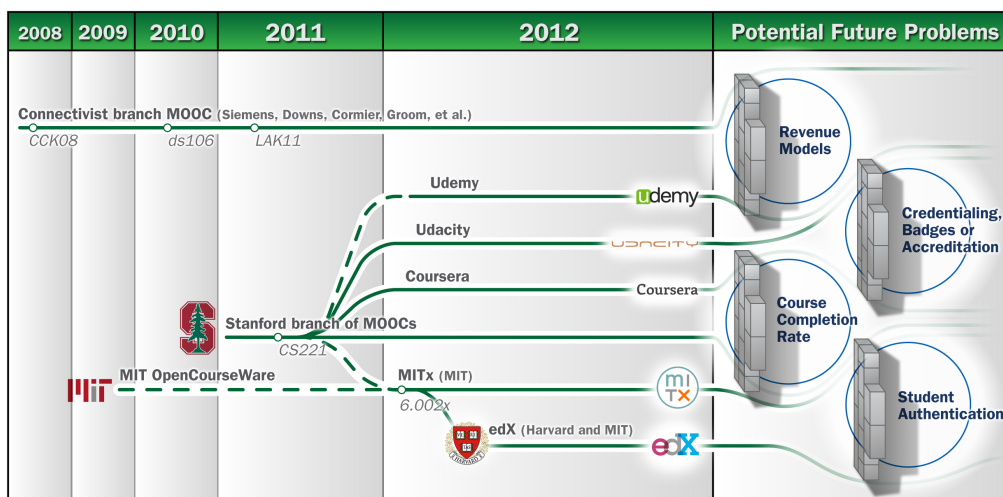
Massive Open Online Courses (MOOCs) have been increasingly developed from the point of view of universities, mainly for education but also for start-ups. At present, the main MOOCs reside on platforms

such as Coursera<sup>1</sup>, EdX<sup>2</sup>, Udemy<sup>3</sup>, MITx<sup>4</sup>, Udacity<sup>5</sup> and FutureLearn<sup>6</sup>.

‘MOOCs is an online course with the option of free and open registration, a publicly-shared curriculum, and open-ended outcomes’ [42].

MOOCs have been a trend of innovation, and are experienced through the use of technology, which provides learning opportunities for a huge number of learners/students. It is simply a new way of learning. These courses are usually of short duration and low cost or with paid access. These offer a middle ground between the online teaching and the highly organised and structured classroom environment. The mode of learning in the MOOCs is directed towards clearly organised goals and results. The professor provides the form and direction in which he/she wants the student to follow to reproduce the best learning experience, forming groups and giving assessments, with goals and guidelines.

Figure 2.2 from *Four Barriers That MOOCs Must Overcome to Build a Sustainable Model* [4] presents us to the evolution of MOOCs, symbolising a small schedule with the main bases of educational experiences and their investment.



**Figure 2.2:** The evolution of MOOCs from their earliest formations to the main platforms currently (from [4])

In subsequent generations, we will see if MOOCs will be able to overcome all the limitations that lie ahead. The main obstacles to MOOCs are as follows:

- To certify the students to satisfy the conditions demanded by the accrediting institutions and later the contracting of companies that at the level of the student can really be recognised by the MOOCs that they did;

<sup>1</sup> <https://www.coursera.org>

<sup>2</sup> <https://www.edx.org/>

<sup>3</sup> <https://www.udemy.com/>

<sup>4</sup> <http://odl.mit.edu/mitx>

<sup>5</sup> <https://www.udacity.com/>

<sup>6</sup> <https://www.futurelearn.com>

- To develop revenue models to create the concept of self-sustainability;
- To provide a better course experience and achieve higher completion rates for MOOCs so that they are still low at the time;
- Deliver certificates or completion certificates that have some value in the market, so that they are accredited by competent entities and that they have been accepted in accredited programmes.

## 2.6 Nanodegrees

The Udacity platform has adopted a model based on MOOCs, creating the programmes nanodegrees<sup>7</sup>. A nanodegree programme is an online educational offer where most nanodegrees programmes take between 6 months to a year to complete. The beginning of each nanodegree programme usually begins at the time of student admission to this programme.

The amount is charged monthly, it means that the total cost will vary depending on how long the student takes to learn. According to Bidarra & Coelho, nanodegrees are just one example, but there are others: Coursera started 'Specializations', Udacity coined 'Nanodegrees', EdX has 'xSeries' and FutureLearn offers 'Programmes' [43].

The nanodegrees programmes present current curriculum produced by industry leaders and are taught by specialised professors. There are no prerequisites, however, in some nanodegrees, there may be some distinct requirements as they differ according to the programme. The minimum requirements include: The student has to be self-motivated to learn; participation in this programme requires consistently meeting deadlines; Knowledge on how to communicate proficiently and professionally in written and spoken English; and having access to a computer with a connection to the Internet is a necessity.

## 2.7 Corporate Open Online Courses (COOCs)

When a course is done in online mode and limits its participants to a particular company, they are called Corporate Open Online Courses (COOCs) [44]. Here you can have discussions about the lessons learned about a certain topic carried out within the company.

Designed in the MOOCs model, COOCs are training modules for two types of audience: employees of a company and its customers. The COOCs are thus a way to help the employee acquire new skills or develop the skills they have. Companies are starting to use COOCs to offer various training courses for their employees, including technical training. The benefits of COOCs to businesses are real. That is, they have a substantial reduction of costs and acquire standard training offered to employees.

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<sup>7</sup><https://eu.udacity.com/nanodegree>

**Table 2.1:** Classification of online distance learning applications (from [7])

		Number of Participants		
		Unlimited	Limited	
Time Dependency	Asynchronous	<i>Distance Learning</i>	<i>MOOC (Massive Open Online Course)</i>	<i>SPOC (Small Private Online Course)</i>
		<i>Traditional Learning</i>	<i>e.g., community college offering several time slots for the same fundamentals course, which gives quasi-asynchronous choice to a student</i>	<i>e.g., individual/ small-group language tutorials with a private teacher scheduled according to student availability</i>
	Synchronous	<i>Distance Learning</i>	<i>SMOC (Synchronous Massive Online Course)</i>	<i>SSOC (Synchronous Small Online Course)</i>
		<i>Traditional Learning</i>	<i>e.g., undergraduate lecture in amphitheater with stadium seating</i>	<i>e.g., PhD course on a specific method or research topic</i>

## 2.8 Small Open Online Courses (SPOCs)

The Small Private Open Online Courses (SPOCs) are online courses whose only difference from the MOOCs referred to in the Section 2.5 is to offer a limited number of placements and therefore have some rules when students make an application to study. As the number of vacancies is limited in opposition to MOOCs, their enrolment becomes competitive. However, you may be charged a fee for the registration. SPOCs are a variant of MOOCs, within several other variants.

Like any other training course, the curriculum should be attractive, otherwise, it will not attract future students. When the course is too theoretical it will quickly lose the public's attention to more practical ones [45].

In addition, the more students there are, the larger the community. Information exchanges between students and discussion groups provide greater depth to the open knowledge base. This is the era of social self-teaching.

These definitions enable us to classify online distance learning applications according to two dimensions: the number of participants and the degree of time dependency (see Table 2.1).

## 2.9 Synchronous Massive Online Course (SMOC)

From the variants in the MOOCs it was found that there is a space for a type of extremely important learning in today's industries. The initial learning of the organisation, as well as the transmission of essential procedures in force in organisations [46].

The transmission of knowledge today requires a considerable amount of time whenever a new employee joins the organisation. These knowledge transmissions do not fit the MOOCs, at most, it could be approximated to the SPOCs however, there is information that is not private, such as the case of hygiene and safety training at work, is transmitted internally within the organisation. As a result, the designation of Synchronous Massive Online Courses (SMOCs).

The differentiation of this is due to the fact that it is possible to have small courses, be private, this type of training can be to save time for the organisation and at the same time convey important, accurate information and consistent with all employees, allowing them to be updated and available to users, whether in connected environments or the Internet or Intranet, such as in disconnected environments, without access to the corporate network or the Internet.

## **2.10 Synchronous Small Online Course (SSOC)**

The term SMOCs is used to refer to these courses. In a similar spirit, when referring to classes for which the number of participants is limited, we use the term Synchronous Small Online Courses (SSOCs) to refer to courses in which all students must participate in real time, and SPOCs otherwise [46].

There are diverse characteristics and attributes that MOOCs can have, which can be used to classify them in different ways. Considering time, courses can be synchronous or asynchronous, meaning that learners are carried through the course at the same time, or can access it in their own time, respectively. As such, these courses have sometimes been labelled as SMOCs, or SSOCs [47]. The degree of 'openness' of a course can give rise to a variation of MOOCs, such as SPOCs, that was mentioned above.



# 3

## Research Methods

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In this section, step 2, 'Selecting cases and determining techniques for data collection and analysis' we will present the case chosen and the techniques that were used for this study.

### 3.1 Case Study

There is no standard definition of a case study. For our purposes, we will draw our definition from those presented by Bonoma [8], Kaplan [9], Stone [10] and [11]. A case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organisations). The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used. We believe that the case research strategy is well-suited to capturing theories from it [48]. Table 3.1 contains a list of eleven characteristics of case studies summarised from the papers mentioned above.

To summarise, there are three reasons why case study research is a viable information systems research strategy. Firstly, the researcher can study information systems in a natural setting, learn about the state of the art, and generate theories from practice. Secondly, the case method allows the researcher to answer 'why' and 'how' questions, that is, to understand the nature and complexity of the processes taking place.

Questions such as, 'Why is the Master's in Information Systems and Business (MISE) a success story?' are critical ones for researchers to pursue. Third, a case approach is an appropriate way to research an area in which few previous studies have been carried out. With the rapid pace of change of the information systems field, many new topics emerge each year for which valuable insights can be gained through the use of case research.

In addition, we produced three conceptual maps of three categories, interview transcripts, and finally, we all composed with the help of NVivo [49]. Because of this, we decided to build three conceptual maps. Each associated with each represented category.

The three categories were classified by:

- Category 1 - the students that are currently enrolled in the master's degree (1<sup>st</sup> year);
- Category 2 - students that have already finished all (or at least most of) the courses and are now working on the thesis;
- Category 3 - students that have already discussed the thesis, and so completed the master's degree.

To conclude, we have defined these issues as outlined above and will answer the questions throughout the document, with a greater incidence on Chapter 5. In addition, three categories were created to allow us to distinguish some of the differences we have encountered in the course of our study. In the

last Chapter 6, after the analysis of the respective study, the main and central question of this case study has been answered.

In the present study, we selected as the case the MISE. It has a partnership between the UAb and the IST that holds a course that aims to ensure the training of qualified people with solid foundations and several skills in technologies, especially in enterprise systems.

The business market in the world and in organisations need the latest technology more than ever and in this way meets these needs so that society is constantly changing.

This is aimed at candidates who wish to investigate their knowledge and qualifications not only within the area of technologies but also within organisations, reaping the benefits of the advantages of DE. A strong coordination team will support the personal learning procedure of each student throughout the course, through a set of pedagogical support mechanisms to the student, namely:

- Coordinate the virtual space for the students and be available whenever possible to take the question to the student;
- Creating modules to support student study, in environment online;
- Stimulating and promoting the socialisation space (Social Forum);
- Managing the performance of professors in curricular units;
- Support students in the selection of research topics for the dissertation.

The main objective of this Master's Degree is to train professionals with solid background and skills in technologies and business systems and in the operation of organisations so that they can meet the needs of constant technological innovation in companies and organisations. The course supports the following general objectives:

- To offer knowledge based on models and theories in order to create problems, that is to say, that generates to the student questions to reason and that the use of information and communication technologies in a more specific way in the organisations is fomented;
- Stimulate the autonomous professional work so that models are developed that will be suitable later in the intercession of organisational projects, such as the learning of applications of business systems; Validation of the use of applications and methodologies in scenarios of use, recognition and evaluation of the technologies arranged in an organisational context;
- Prepare students for forms and for the scientific practice of research projects.

The course mostly operates on the online scheme, however, there are also a few compulsory intensive sessions concentrated in 1 or 2 weeks per year, in the form of a seminar and/or workshop.

**Table 3.1:** Key characteristics of case studies (adapted from many authors [8] [9] [10] [11])

1. The Phenomenon is examined in a natural setting.
2. Data is collected by multiple means.
3. One or a few entities (person, group or organisation) are examined.
4. Case studies are more suitable for the exploration, classification and hypothesis development stages of the knowledge-building process; the investigator should have a receptive attitude towards exploration.
5. No experimental controls or manipulation are involved.
6. The investigator may not specify the set of independent and dependent variables in advance.
7. The results derived depend heavily on the integrative powers of the investigator.
8. Changes in site selection and data collection methods could take place as the investigator develops new hypotheses.
9. Case research is useful in the study of 'why' and 'how' questions because these deal with operational links to be traced over time rather than with frequency or incidence.
10. The focus is on contemporary events.

Students in the dissertation should be able to create and carry out an investigation in the areas of interest chosen by the student, inherent to the course. And yet, know how to expose and demonstrate through public evidence of defence of the master's dissertation. MISE has a mandatory requirement in addition to others, this master's degree requires a connection to the Internet. Students have to have a proficiency in reading and understanding the English language, and even if they have up to three weeks in sessions of face-to-face teaching.

The duration of the course is 2 years of curriculum. In the first year it accommodates the effort of 60 European Credit Transfer System (ECTS), and in the second year, it corresponds to 60 ECTS for the dissertation and the preparation of the same. All the chairs involve the value of 7.5 ECTS each, equivalent to 210 working hours, of which 40 are contacted by the professor and the rest of the student's work since it is distance learning and the study and learning focussed on the student [50].

All MISE disciplines use the university's e-learning platform Open based on Moodle<sup>1</sup> that lets you share content, publish messages, receive jobs, and assign notes. In addition to offer a number of more advanced features (which have been explored by some MISE professors) such as peer review or even *gamification*.

A UAb is the Portuguese University of distance learning par excellence, offering courses on a University level in the different cycles of space from Portugal to African Countries of Portuguese Official Language (PALOP), where the main language is Portuguese.

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<sup>1</sup><https://elearning.uab.pt/>

The Open University of Lisbon is a reference school in the field of engineering education, with its recognition of extending beyond the borders of the national territory.

From informal conversations among some IST professors, a training course focusing on information systems, but capable of providing advanced training, at the 2<sup>nd</sup> cycle level, is being created for all:

- Have a bachelor's degree/1<sup>st</sup> cycle or relevant professional experience in the field of computer science or information and communication technologies and who wish to update their knowledge and skills;
- Have a bachelor's degree/1<sup>st</sup> cycle or relevant professional experience and wish to undertake a retraining of skills.

The proposal for the Bologna Master's in Business Information and Systems was born in this way, and a specific collaboration protocol was established for the purpose of the joint development of this course and establishing the main guidelines for its operation. The course was submitted to the Agency for the Evaluation and Accreditation of Higher Education (A3ES) in September 2012 and was approved in May 2013, and the start-up of the course began in the year 2013/2014.

## **3.2 Techniques**

The techniques used in this research were several, from the conception of interviews through semi-structured interviews to surveys, we used conceptual maps, Business Model Canvas (BMC) and also used the focus group. Based on this study, the case study method was practised. These techniques are listed below.

### **3.2.1 Conceptual Maps**

It was decided to use the conceptual maps technique since it demonstrates qualitatively the information in question-based on a graphical representation [51]. Conceptual maps can be analysed by online platforms or even by software installed on the computer such as CmapTools [52] and Microsoft Excel. This method of qualitatively quantifying information can be combined in educational research by helping in visualisation qualitative data to further simplify the discovery of patterns associated with the information.

The patterns found in conceptual maps can be used to clarify the different understandings and the information exposed. Concept maps are intended to represent meaningful relationships between concepts in the form of propositions. 'Propositions are two or more concept labels linked by words in a semantic unit' [51]. The analysis of conceptual maps can be quantitative or qualitative [53].

Since each person has a different opinion, we decided to make three conceptual maps, one related to an individual person and another called global, which aggregates a set of concepts from several people interviewed. The steps taken to design the conceptual maps [54] were as follows:

1. Draw an outline of the map constituted by the main ideas of the participants;
2. Complete the map sketch previously done to get the conceptual map of the respondent;
3. After completing each conceptual map, compare each one, find common concepts and those that were most visible to the interviewees;
4. Draw the final conceptual map.

Conceptual maps occur during an interview between the interviewer and the subject, who is being interviewed. Typically, a session will last about an hour and then Conceptual Maps are worked and reflected upon [55]. Although the research has generated important and interesting evidence, there may still be several problems.

### 3.2.2 Business Model Canvas

'BMC' or 'Business Model Framework' is a strategic management tool that allows you to develop and draft new or existing business models. It is a pre-formatted visual map that contains nine blocks of the [56] business model. O BMC was initially proposed by Alexander Osterwalde [56].

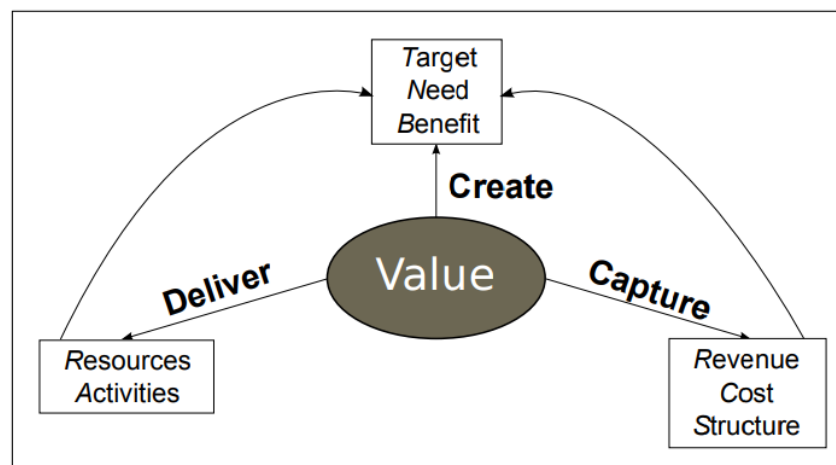
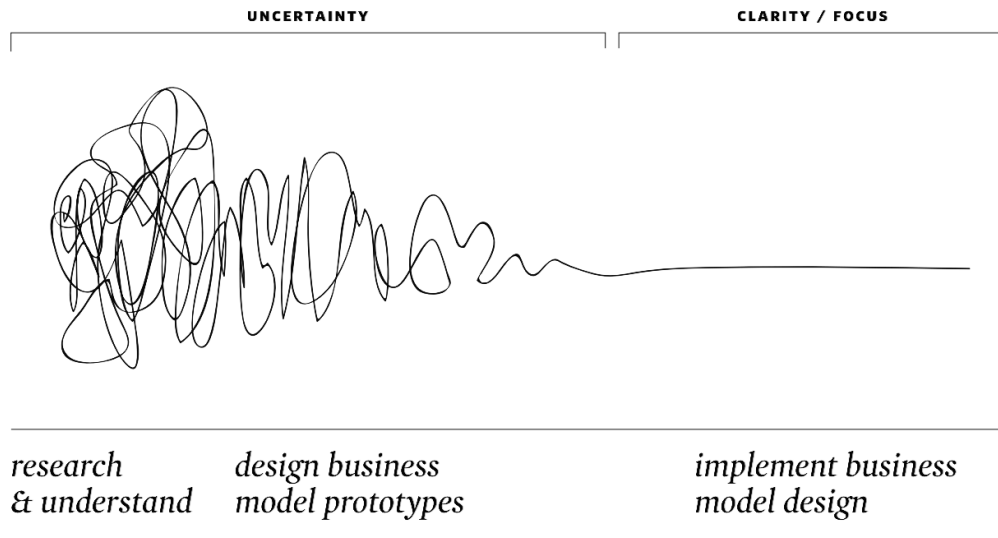


Figure 3.1: The value in the centre of the business (from [5])

In Figure 3.1 withdrawal from *Business Model Canvas Perspective on Big Data Applications* [5] describes the most important of its larger envelopes. The one who creates value, the one who delivers and finally the one who captures.



**Figure 3.2:** ‘The Process of Design Squiggle’ adapted from Damien Newman, from the Central Office of Design

Business Model Canvas is essentially designed to reach conceivable budgets due to changes in internal and external referential. The Business Model Canvas is very useful since it helps detect the weakest points and still perceives the inflows and outflows, the cash flows.

However, the analysis of the external and internal frameworks of activities for possible future changes should not be ignored. Figure 3.2, taken from *Business Model Generation* [56] shows us another way to detect BMC.

‘The Process of Design Squiggle’<sup>2</sup> second Damien Newman includes features of the design process from the outset, where it is disorganised and confusing to the point where it focuses more on a single point with increasing transparency. Just like a stone in it’s rough format, is chiselled and transformed to obtain an unrivalled masterpiece.

### 3.2.3 Interviews and survey

To validate and analyse the data for the MISE case study, this research intends to conduct an assessment through interviews with people from the 1<sup>st</sup> edition of the MISE to the current 5<sup>th</sup> edition. After the first phase, later interviewing people progressively in the following editions, reaching the one that is currently in force.

Semi-structured interviews were used where they have open-ended questions to guide the interview, but there is some flexibility to change the questions [57], both the order and the questions of how the interview comes up, using a questionnaire. We used surveys to respond to participants and provide their input that will be analysed and used to improve statistical work. In this questionnaire a 5-level Likert scale

<sup>2</sup><http://centralstory.com/think/tag/the-design-squiggle/>



is presented, where 1 - strongly disagree and 5 - strongly agree and at the end of the questionnaire, we have an open-ended question and answer with suggestions [58].

The face-to-face and semi-structured interviews require a lot of skill in the performance evaluation decisions. The investigator must be very careful with the words and terms used. While there is guidance in the questions asked, it is sometimes difficult to control the session. Sometimes respondents also try to escape from providing detailed information, maybe because the topic of discussion is very sensitive and he/she isn't ready for an open discussion; or even refusing to do the interview. The survey is in the Appendix C, in Figure C.1, with the questions that were asked.

Having the information processed and the data analysis done, it is then possible to draw conclusions from these approaches. The interviews were carried out to be able to do the conceptual maps and to be able to understand the main concepts of more advantageous and less positive topics.

### **3.2.4 Focus Group**

The Focus Group (FG) is a method of the targeted interview within a small group aimed at encouraging a discussion about specific topics [59]. It is a classical tool to have good quality research. Basic principle: the social interaction created during group interviews, is an effective reproduction of the process through which people form their own opinion. The golden rule is that there is no standard or correct way to do a FG.

Especially in the Langford book [60], he will realise that there are N ways of conducting the FG in the various stages depending on your purpose. Some things we had to keep in mind in the first stage: what is our target, e.g. what people do we want to interview (including whether they are experts or not). And then we have to explain the criteria used and the profile of the participants. Consider whether we want a more homogeneous or heterogeneous group. How many sessions do we want to carry out and with how many people/sessions (knowing that a FG should have between 4 and 8 people, maximum 12) [61].

We get some people by speaking directly and others people by e-mail. Other components to be taken into account are the length of sessions, date and location of sessions. The main method used, was to prepare a semi-structured interview script, to cover all the points I wanted to clarify, yet leaving space so that they could deviate from those points. There are other methods, such as brainstorming, three thinking hats, post-its, etc. At the level of data collection, we record the audio session. It may be necessary to get a consent form to gather information during the FG [61].

The FGs begin with a presentation of myself and the project, and some information about how the session will take place and guaranteeing data anonymity. We begin by transcribing everything you have heard because we recorded the session. Otherwise, we have to organize the notes/post-its, or other methods used for registration.

Focus group results produce large amounts of data. During qualitative marketing research analysis,

convert data into information and knowledge. Ask how the focus group results and knowledge answers research objectives. They are our findings. It's insight development [62]. Now we are ready to write a report. We used qualitative marketing research to explore, discover, describe, gain depth, and chart direction.

The main goal of this focus group was to understand how to improve this master's degree, the MISE, we want to understand some of the problems reported by MISE students, in this case concerning the latest issue of MISE, the 5<sup>th</sup> edition; perceive it according to the experience of each student, their motivation and their obstacles. Another additional objective was to understand what students think about the use of distance learning, and in particular a distance master's degree in partnership with IST and UAb and address some of those problems. In particular, we discussed the master's degree students' ways of learning and understand how it could be improved for future editions.

Participants are distance master's of MISE. They belong to the experimental group, consisting of 28 people, all of them already have a bachelor's degree, at least, something that IST requires of students who are applying for the master's degree. This selection was made for convenience that is, they were the students of the 5<sup>th</sup> edition of MISE who were in the residential week, and for that reason, they have become useful. The focus group session was designed to be semi-structured that is, we defined the question areas and some issues, but we allowed flexibility and improvisation, clearing the path to explore emerging lines of research.

The protocol consists of four parts, each with a duration of 10 to 15 minutes: experiences on the subjects; experiences and insights about job submission; presentation and discussion of the dissertation proposal; and finally considerations to summarise the session. As recommended for focus groups, only one session was held with 28 students. That's because this group of students was in their residential week (a large group of students) would not give more time to do separate sessions. The single focus group session was held in July 2018 in Setúbal, Lisbon where the residential week was held and lasted for about 60 minutes.

We started the session by giving an overview of the study objectives and discussing how students should participate and act during the session. In this way, we tried to ensure that the participants were comfortable and gave sincere opinions that represented the real scenario. Since we ensured that everything the participants said would be completely anonymous and the data would only be used for the construction and study of this case study. The researcher worked as a facilitator of the session together with the other two master's coordinating professors, motivating the participants to discuss and lead the discussion.

No annotations were made, but the entire discussion was recorded on audio with the permission of the participants. The anonymity of focus group participants is protected in this report. Shortly thereafter, the session results were transcribed from the audio records, where they were documented, and some

notes were entered where appropriate. From this point, all the work was done on a copy of the transcript, to ensure that the original file was kept, should we need to consult it. Transcription was simplified by the removal of non-essential words. Finally, one title was chosen for each category and the main conclusions were summarized.



# 4

## Results

### Contents

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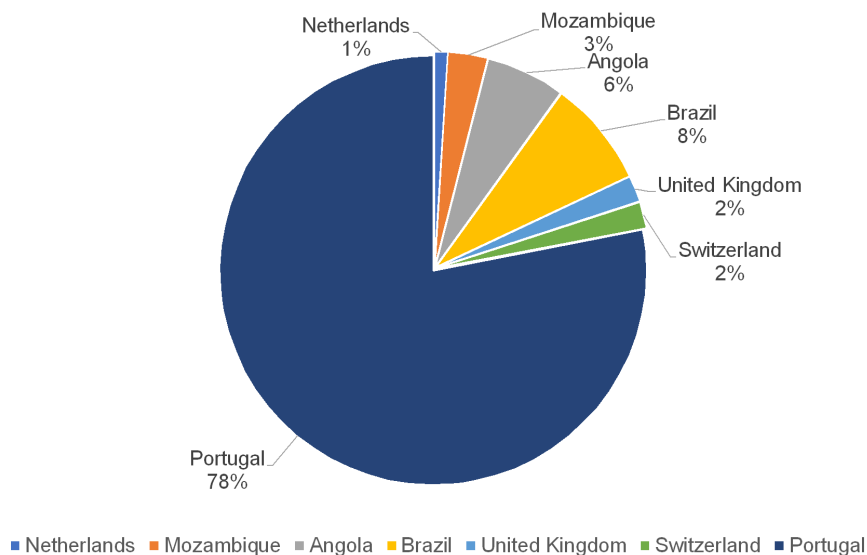
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This section corresponds to the 'Prepare, Collect and Analyse' step of the research method, and presents the direct analysis to the interviews, the questionnaire and as well as the conceptual maps based on the interviews.

The applications for the first edition of the MISE took place in two distinct phases, in June and the end of August. A total of 64 candidates (for 60 *numerus clausus*<sup>1</sup>). In the first edition, there were a considerable number of foreign candidates, coming from both Portugal and the PALOP, with a total of 8 candidates.

## 4.1 Candidates



**Figure 4.1:** Number of candidates by country of origin of the first edition of the MISE

In Figure 4.1 we can see the relationship between the number of foreign candidates and the number of Portuguese candidates, residing in Portugal.

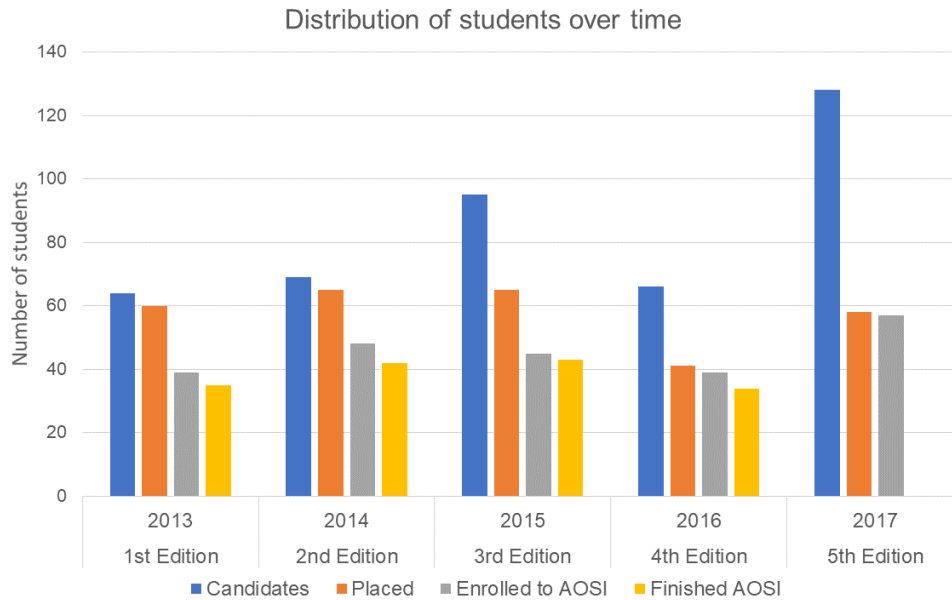
It should be highlighted that the existence of several Portuguese candidates are resident in countries such as Holland, the United Kingdom and Switzerland. Nonetheless, the vast majority of MISE candidates reside in Portugal. Of the 60 candidates selected from the 1<sup>st</sup> edition of MISE, 39 were enrolled in MISE. The gap between the selected candidates and the total number of entries has a lag. This is essentially due to two factors:

- A high number of candidates who wanted to attend a 2<sup>nd</sup> cycle course and who applied for several courses and who upon selection chose the one that interested them the most;

<sup>1</sup>Numerus clausus (closed in Latin) is a concept of law property that limits the number that is, it is one of many methods used to limit a number, in this case, of students studying at university [63].

- Several foreign candidates didn't complete the entire registration process.

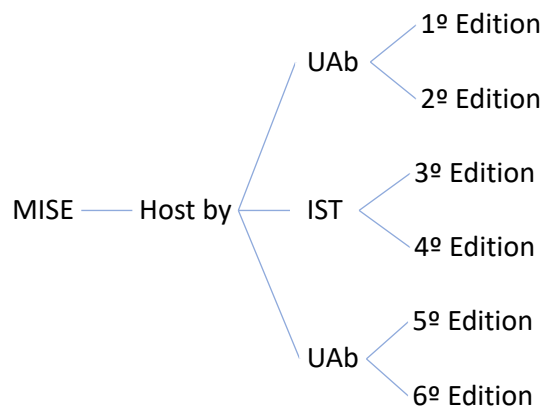
## 4.2 Number of students over time of MISE



**Figure 4.2:** Distribution of students throughout the various editions of the MISE

According to Figure 4.2, it is possible to detect that the number of candidates has increased linearly, however, the number of positions has remained practically constant. Faced with the subject of Organisational Architecture of Information Systems (OAIS) a growth accompanied by the number of places.

The number of candidates has not only always been higher than 60 places every year has also shown



**Figure 4.3:** Host by edition of MISE

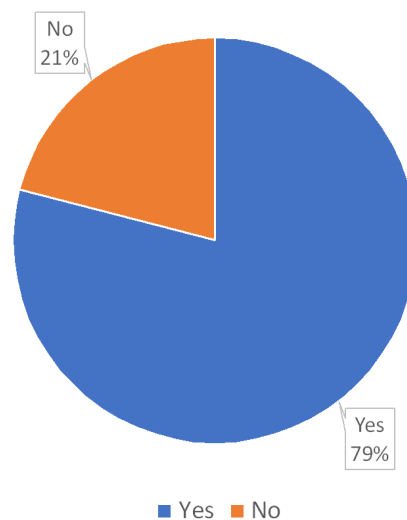


a growth trend over the years. as shown in the Figure 4.2. The first edition took place in the academic year 2013/2014. It is not easy to justify the number of candidates in the 4<sup>th</sup> edition, but the amount of fees charged by the IST for students who are not Portuguese or resident in the European Union (EU) (about seven times more) practically eliminates all potential candidates from Brazil and Africa.

Another reason for this poor performance in terms of candidates in the 4<sup>th</sup> edition was due to the exclusion of candidates without a completed degree. In Figure 4.3 demonstrates the faculty of the host in each year of MISE by edition.

### 4.3 Residential week

In this master's degree, there is a residential week at the end of the first year, so that the students are together and with the professors as well. It is this week that students define their theses' topics. Figure 4.4 represents the number of students interviewed who went to the residential week or were thinking about going. Most students who have considered the week very important and indispensable.



**Figure 4.4:** Percentage of students who went to the residential week of all editions

The residential week has been affirmed with one of the good practices of MISE since only five working days instead of several months, all students and professors (who are present) and assign all master thesis and their advisors. Some the students didn't attend this week because of work-related problems and questions about their families. For example, there is the problem of reconciling the children's holidays and the students' own holidays.

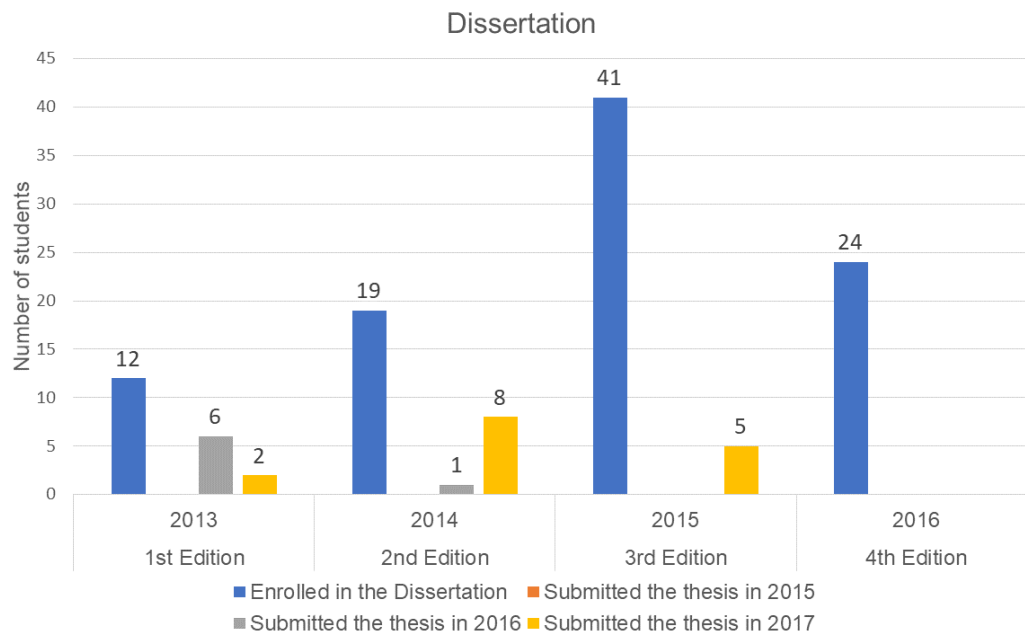
Besides, in some companies, it is more restrictive to combine the holidays since this week is not considered a week of master's exams. This week is an opportunity to choose the subject of the dissertation and to meet your colleagues. With whom they worked throughout the year and this week is the

opportunity to get to know each other personally and physically. Thus, they could change their opinions.

## 4.4 Dissertations of MISE students

Figure 4.5 both exposes the number of students who enrolled in the dissertation, during the various editions of MISE and those who successfully completed it. Since MISE students take, on average, four years (mainly due to his full-time professional activity), we expect MISE to finish between 15 and 20 students per year.

In this way, it can be observed that the number of students who enrol in the dissertation is much higher than those who finish it. By itself, the dissertation is a work of an autonomous nature. However, one of the aspects to still be verified is why so few students finish and submit their theses.



**Figure 4.5:** Number of students enrolled and how many completed the dissertation subject before the various editions of the MISE

$$E = \frac{(A * ECTS)}{60} \quad (4.1)$$

Using Equation (4.1), where:

- $A$  is the number of students evaluated in a given subject;
- $ECTS$  is the number of credits according to the European system of transfer and accumulation of credits; in MISE it is usually 7.5 ECTS, taking the subject of project and dissertation;

- $E$  is the total effort of the faculty;
- 60 is the total number of ECTS that the master's degree has.

In Equation (4.1), one can see the impact of the hours given by professors in MISE. Therefore, it corresponds to  $X$  hours of professors for the teaching effort (credits), which equals weekly hours of classes.

Relative to BMC, some data were also obtained. In this way, the concatenations of the MISE and the Master's Degree in Bologna in Information and Software Engineering (MEIC) are found in the Figure D.1(a) and Figure D.1(b) in the Figure D.1.

**Table 4.1:** Number of students enrolled in some of the main master's degrees, number of those who completed them, and the total number of graduates per edition of MISE

Edition	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
	2013	2014	2015	2016	2017
Candidates	64	69	95	66	128
Placed	60	65	65	41	58
Enrolled in AOSI	39	48	45	39	57
Completed AOSI	35	42	43	34	-
Enrolled in ATE	34	35	45	39	-
Completed ATE	29	27	35	31	-
Enrolled MI	26	31	44	37	37
Completed MI	19	19	27	27	-
Graduates in 2016	6	1	0	0	0
Graduates in 2017	2	8	5	0	0

In Table 4.1, data for students enrolled in three subjects, of which OAIS, Enterprise Technological Architectures (ETA) and the last Research Methodologies (RM) are displayed. In the OAIS subject, there was an average of 5 dropouts, this being a 1<sup>st</sup> year and 1<sup>st</sup> semester. In the ETA subject, there was an average of 8 dropouts, this being a 1<sup>st</sup> year and 2<sup>nd</sup> semester. Finally, a subject preparing for the dissertation, RM, there was an average of 12 dropouts, this being a 2<sup>nd</sup> year and 1<sup>st</sup> semester. Since this last edition, the 5<sup>th</sup> edition of 2017, this course is taking place during this exact semester and for the same reason, no one has yet completed this course.

This course aims to provide students with a critical scientific development space. While the main methodologies and practices of research in science and technology giving special emphasis to technologies and information systems. Being in a second-year course, it is noticeable that the number of students that reaches this stage is already smaller and the total number of graduates is also smaller.



# 5

## Analysis of the results

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This section presents the analysis of results obtained from the data collected in the interview techniques, conceptual maps, focus group and survey. That was used in the context of the applied research methodology and corresponds to the 'Evaluate and analyse data' step of the Research Methodology of the Case Study.

## 5.1 Interviews

In this section, we analyse the results from the interviews using the transcripts. A cross-section of the opinions in the broad field of master's degree learning is envisaged, hence the choice of a targeted selection of multiple respondents as research subjects. The information will be cross into three concept maps and transcripts of interviews.

The interviews were chosen to be used in this study based on what was shown earlier. Due to the data collected by this method are valuable as they are unstructured and can give new perspicacity into new issues [64].

All interviews were made with access to a tool, called Skype. As it becomes simpler for students, they gain access to this platform. And because most of them were dispersed both by the country of Portugal and by other countries of the world.

Skype interviews took place six months according to the students' availability. Students were told that they could withdraw from the interview at any time and that interviews would be confidential and anonymous. After permission to do so, the interviews were recorded and later transcribed. In this document, we show some of the excerpts. An analysis of the interviews was treated by us. All the interviews were read closely.

All students in the sample were female and male and aged between 24 and 74 years old. All stated that their motivation for the study is related to career, personal development, or simply for their own satisfaction and to feel busy during their day. In the following section are the results that were collected over time according to the methodology chosen, the Case Study Research Methodology.

**Table 5.1:** Numbers of enrolled students and graduates by edition of MISE

<b>Edition</b>	<b>1<sup>st</sup> 2013</b>	<b>2<sup>nd</sup> 2014</b>	<b>3<sup>rd</sup> 2015</b>	<b>4<sup>th</sup> 2016</b>	<b>5<sup>th</sup> 2017</b>
Enrolled (for the 1 <sup>st</sup> time)	39	48	51	36	56
Enrolled in the dissertation	12	19	41	24	-
Total graduates	8	9	5	0	0
Total graduates/ enrolled in the dissertation (in %)	66,7	47,4	12,2	-	-
Total graduates/ enrolled (for the 1 <sup>st</sup> time) (in %)	20,5	18,8	9,8	-	-

**Table 5.2:** Number of students interviewed by category edition

<b>Type</b>	
<b>Category</b>	<b># of students</b>
The students are currently doing the courses	15
Students who have already finished the courses and are doing the dissertation	31
Students who completed MISE	15

Regarding the analysis of qualitative data, our main goal is to draw conclusions from the data. Therefore, the presentation of the interviewee's data and opinions through transcripts are fundamental in this regard. The data collected from the interviews will be displayed next. In this way, we will have enough information based on transcriptions. This information is word-based.

We have decided to use a tool to help us, to which sections of text or testimonials are assigned in categories. Consequently, we will get some questions that come from these statements. This procedure makes it possible to stack quotation marks and expose the patterns that are being found and to show the evidence found. The tool chosen by us was a qualitative data analysis software NVivo 12 [65].

The goal in the design of NVivo was supporting a weaving of rich primary sources with commentary and discussion and analysis, our evolving discussions and writings that distinguish research from data archiving.

Through the NVIVO tool, we can observe the most meaningful information for this case study. All three conceptual maps were constructed through all the interviews made to each specific category of each corresponding student in that same category. In all, were made (sixty-one interviews for the total of two hundred thirty) is presented from the 1<sup>st</sup> edition of the MISE to the current 5<sup>th</sup> edition. It was possible to reconcile several factors of several students when they went against the same cause.

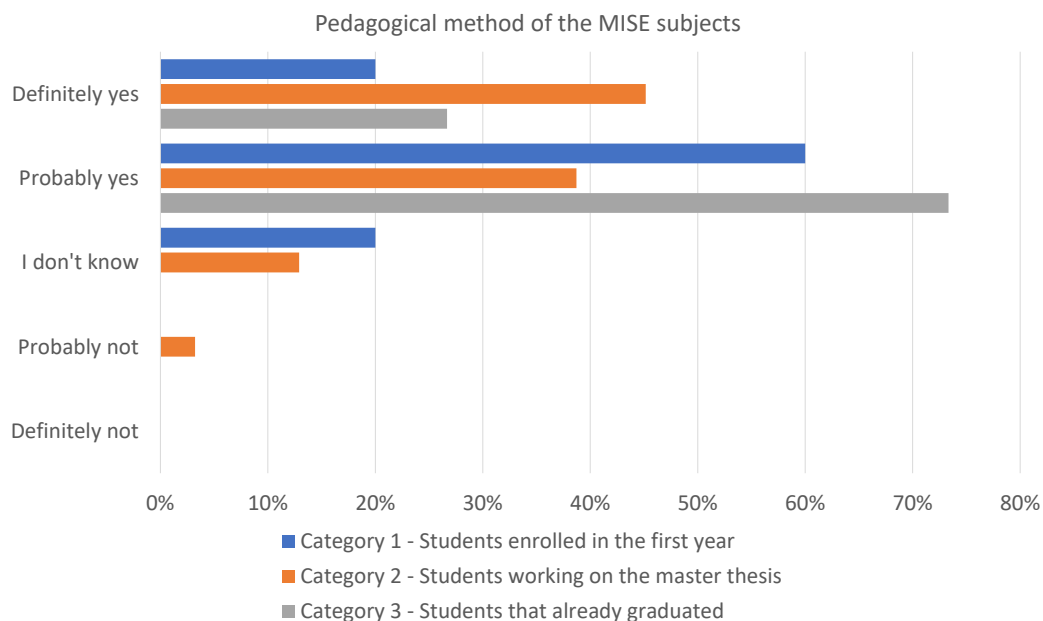
That is, many of the people they were looking for was the flexibility and being at a distance. For the fact that it is online greatly facilitates the lives of students who work and study. However, some of them heard about the course by friends who had already taken the course.

Most of the students who knew this master's degree online did so by searching the internet. They found more information on the IST website and on the UAb website. However, some of them enrolled for the course due to the fact that some friends had already taken the course.

As we can see in Figure 5.1, category 3 are those students who have already completed the course, can have a different view from those who are still starting or finishing the master's degree. This is shown in this graph and the following in Figure 5.2.

In this Figure 5.1, in category 1, is for those students who are in their first academic year of the master's, considering with greater weight 'Probably yes'. Through some of the testimonies, we have been able to perceive some of the material given and transmitted by the students following the MISE pedagogical method in the various subjects during the masters. *'Only a few very technical reference*





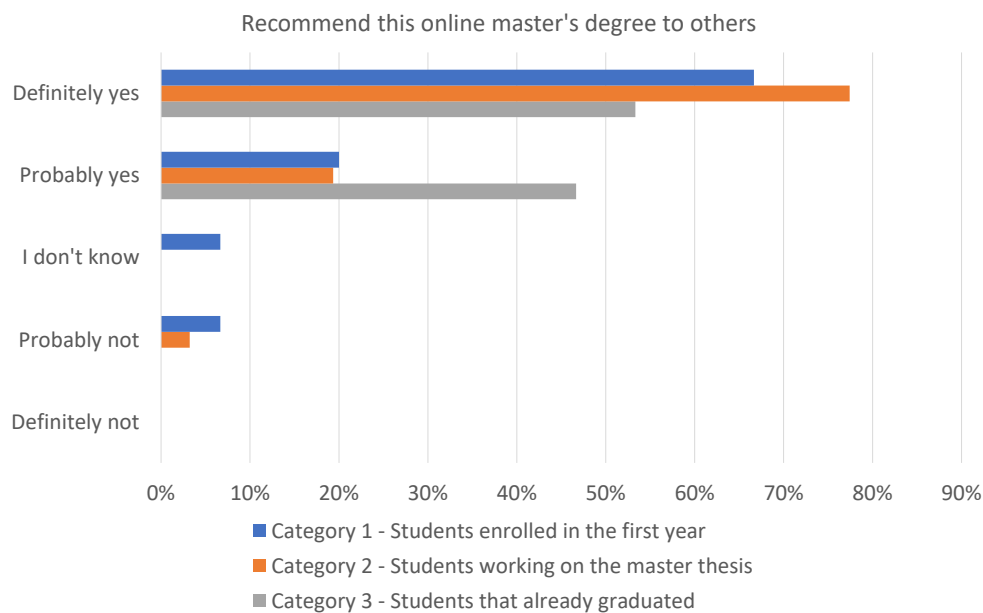
**Figure 5.1:** Pedagogical method of the MISE subjects

*manuals are not available even in large bookstores, it becomes difficult to find' and 'I really liked the new platforms we worked on to get the job done. The texts could be more elaborated and there is no production of videos for learning content'.*

That the teaching method of MISE is appropriate to the various subjects of the course. In category 2, students who are currently doing their research in their master's theses, there are already some opinions a little more dispersed by the chart. Although most answered 'Probably yes' and 'Definitely yes' around 5% of 'Probably not' still prevailed, in which some students would not agree with the pedagogical method present in MISE.

We can verify that in Figure 5.2, the vast majority of people recommend this online master's degree to other future students. Primarily, as in category 3 in Figure 5.1, they continue to suggest and recommend this online master's degree to others. In general, we can analyse the figure and say that students would consider 'Definitely yes' when advising a friend or relative when they wanted to choose a master's degree.

One of the students said that he would recommend this master's degree to other future students '*for the possibility of learning new knowledge in a way that is simple to learn and adapted to the professional life*'. In addition, to be flexible, it's a master's degree that has enough quality, from the faculty to the material that is made available by the professors.



**Figure 5.2:** Recommend this online master's degree to others

## Criteria for choosing MISE

We started by asking the interviewees what their criteria were in choosing this master's degree and not another. Most of the interviewees said that they preferred the criteria of being online and flexible, desktop related, theme interested and using information systems as well.

**Testimonies:** *'It's important to acquire knowledge in an area that generates employment. I'm not a person of this area. The MISE gave me some insight into entering this area at work. The possibility of working in the area.'*

*'Initiation of an area that is the future. Information technology was the main area of interest for me. The fact that e-learning is only the beginning of the future. And this kind of teaching will become more and more common. And introducing the IST higher institute to this master's degree will give more credence to distance learning because it is a prestigious university as is the IST. I learned a lot from the professors. The University of IST and UAb are extremely qualified and have been selected for this master's degree. However, I also learned a lot from the students, the forums and the debates.'*

## The reasons for having a master's candidate

Considering the criteria for the students who chose this master's degree. We were able to understand the reasons for students to take a master's degree. Many students applied to this master's degree for

the training itself and to add value to themselves. The low tuition fees compared to other equivalent courses, is a big advantage, even when comparing it with other countries.

*'I was stopped awhile. We are in a society that values certification very much. It has to be competitive in the labour market and be valued as well.'*

*'Evolution: acquisition of new knowledge introduces progression in my professional and academic career. Professional appreciation is acquired by being involved in new technologies. It opened doors for me in other areas. The master's degree grants other exits for us that only a degree does not confer.'*

## **Expectations about MISE**

In a way yes, the master's degree corresponded to the expectations of all the students. Although in some cases students did not really understand what this master's degree was based on and how this teaching method worked. After all, it is a little different from regular and traditional teaching.

**Testimonies:** *'Yes, it was heavy in the level of hours and mental occupation. I expected it to have been less demanding.'*

*'Yes, due to the good quality of the professors, the details of the knowledge that is transmitted, shows the master's degree to be presented by a very well-planned organisation. The organisation allows the students to work at a constant pace and with adequate feedback from the professors. It controls learning and ensures that students have access to good teaching materials.'*

## **The advantages and the most positive aspects**

Here the students were asked what positive aspects are present in this master's degree. Basically, it taught the students the ability to manage their time appropriately to reach a goal. Apart from that, there is an E-learning scheme allowing students to study at ease, to achieve their own time management. Students found the residential week as very useful both for themselves and for professors. So, they both get to know each other well.

**Testimonies:** *'Acquiring new knowledge is obvious. And the fact of being in e-learning is preponderant. The idea of these two universities getting connected was a fantastic idea. I just have to thank the coordinators to Prof. Miguel Mira da Silva and Prof. Henrique Mamede for the dynamics they place in MISE. They are people who motivate students, I think they are well organised.'*

*'The pragmatic way in which subjects are approached, the texts that are shared; the pertinence and timeliness of the themes shared with students; the flexibility of schedules and experiences of several people from several countries are very positive points.'*

## **The disadvantages and the negative aspects**

Here it was asked what negative aspects are present in this master's degree. One of the major problems noted by students is the fact that there are no videos explaining the courses. Which would be a great advantage seen by the vast majority of students. The lack of real-time online sessions. To put the doubts to the students of the most varied subjects is a great lack. They need some contact tool with the professors that are assigned in a synchronous way.

**Testimonies:** *'There were professors who took a long time to give the answers to the students, to give answers to the doubts and evaluation notes. Some professors who teach at MISE are accustomed to a physical model, where they have their schedule of questions or go to college. And the students either go through times of doubt or meet in college and talk to the professor. And I think these professors did not make this change of perspective. Well, there are no students going to college and doubting professors. The students write their doubts at the times that can be at 3 am or at 4 pm and the professors do not say that it has to be reactive in the hour, but one or two days, a student is already waiting. Some professors are not prepared for distance learning.'*

*'I believe it is difficult for professors to control and monitor all students. In contrast, I feel there is no close proximity between professors and students. If there were many who gave up, they probably wouldn't abandon MISE. There is too much distancing online.'*

## **It was worth attending the residential week**

The residential week was essential for all students since it's during this week where they define the themes of their dissertations. In addition, they get to know their colleagues they work with throughout the year in working groups. The professors of each of the courses were another important element in this week's meeting.

**Testimonies:** *'Yes, it was important because I had contact with the faculty. I got to confirm what I already knew. It was a very competitive university for both parts, the IST and the UAb. Several thesis proposals have been presented, and we have been contacted for theses, which is necessary for a thesis. The dissertation is different there is not a certain obligation as in the courses. There is a parameterization of the times, you have to do this module to get the jobs done. If there is feedback from professors, this discourages students.'*

*'It is important to create bonds with professors and students. Imposition of the topic of the dissertation in the residential week, whereas, the courses of the thesis should occur two to three months before. People are not aware that it is in the residential week that they have to choose the themes.'*

Sometimes there is a number of synchronous interaction between characteristics that may be especially attractive to individuals who feel inhibited or perceive a lack of competence in traditional social contexts. Some of these communicative features include increased anonymity, reduced inhibitions, controlled self-presentation, reduced interpersonal risk (e.g., face loss), and increased confidence [66].

## **Suggestions for improving MISE**

MISE involves the functioning of the courses, the available materials, the Open University platform and it is a pedagogical model. The main suggestions the students made was to have more content based on videos explaining the story. To achieve greater proximity between the professor and student. On the other hand, there is a tool that can be incorporated into Moodle for students to interact in real-time. Communication between students and professors is important. To get your questions answered much faster. In fact, it is a synchronous system and not just asynchronous, as it is currently.

**Testimonies:** *'It would be useful to have already chosen a theme/guidance before going to the residential week. There are available proposals of the dissertation, e.g. one month before the actual week.'*

*'To have an instant messaging component embedded in Moodle. More interactivity from professors. There are explanatory videos in the courses that are possible to do.'*

*'There are many professors who are unaware of teaching e-learning and tend to belittle it a bit. There are misconceptions that people have about online teaching. The area that MISE addresses is very important.'*

## **5.2 Conceptual maps**

Many of the students who have been interviewed in category 1 say that they need more feedback and greater support from professors. Although this course is from a distance, students still need to feel the presence of support. But support and feedback provided to the students are minimal. Students need more follow-up sessions. They felt that there was a lack of online interaction with professors and whenever they interacted, their answers weren't clear and didn't remove student's doubts.

### **5.2.1 Category 1**

In Appendix, Figure B.1 we can see the students who are currently taking the courses and are participating in the first year of the MISE. There are some main points that can be crossed between them, among the various students and that if they coincide.

In addition, students realised that some professors were not prepared for this new type of teaching. Likewise, they took a long time to respond and were not very interactive with the students.

An advantage, indicated by the same ones was the low cost of the master's when compared with others in other countries, like Brazil or the USA.

The level of participation within the groups was often found to be a disappointment because learners had wanted and expected more messages. Another essential point was the lack of time. There were three main patterns of participation: '*communicative*' learning in which individuals expressed concerns and answered to messages in the forum; '*quiet*' learning, in which individuals read mail, but rarely sent messages of their own; and finally, '*non-participation*', in which individuals would drop out of the forum completely for a period of time.

Many questions arise from these findings: How does the online environment shape discussion? Why do some students find it easier than others to contribute to forums?

## 5.2.2 Category 2

In Appendix, Figure B.2, the students who are currently doing the dissertation, already have another type of level and knowledge throughout the course because they are already finishing the master's degree. Category 2, the students who are doing the dissertation, they thought about choosing this master's degree for some simple factors, such as credibility and the prestige that has the University of *Instituto Superior Técnico*.

This University in partnership with the Open University helps students through some flexibility in tuition payments. This is one of the most relevant points since there are some who cannot afford to pay for the course entirely. And this is a great help to them. The students consider this master's demanding and heavy mainly due to the level of work requested by the professors.

This requirement becomes an abnormal mental occupation. In addition, causes abdication of friends and family. Testimony: '*Balancing family relationships. Sometimes I had to stop, to balance family relationships as MISE was 'stealing time'. And the family tension was building up over time. And at a point, when this happens you need to stop a bit and give the family the necessary attention. When the balance is restored, then it is possible to continue the work in MISE.*' As there is no presence, there are no face-to-face classes, the students have great control over their time management, the way they study and the way they perform your jobs.

The residential week was considered by the students as crucial. During this week the students get to know each other. Also, this week allowed students to get acquainted with their professors with whom they have to carry out the most varied works and projects. In this way, network contacts are created through networking. This week is also useful for defining the themes of the dissertation. Some students felt some pressure when choosing their subjects. professors were keen to have all students present on

the residential week as they would leave with a selected topic.

However, some students claimed to have no notion of how to construct a dissertation because people weren't clear about the research methodologies they would use. A good suggestion was that the dissertation themes could come out sometime before the residential week, to give students time to think about the topic beforehand.

Students who apply for MISE are hoping to be able to change their jobs or they need to get a promotion in their area to a management level. Although not all students have the same goals and needs, other students simply want to continue to learn/study, get a better know-how in their area of work or even refresh/update their knowledge. These are some of the objectives of MISE students when enrolling for a master's degree.

One detail recorded by the three categories was the fact that there was an evident lack of material in video format. This type of material gives another type of feedback to the students, gives another type of closeness. And the students miss it. Another suggestion would be the existence of real-time online sessions, with specific formats to mainly focus on students getting rid of their doubts in each one of the courses.

In this way, the student could remove his doubts in a synchronous, practical and immediate way. Thus, the student would feel a greater presence on the part of the professor, the being synchronous part. Consequently, the student doesn't have to create a post and having to wait for the professor's response.

It's very apparent that interacting with the students and the rapid responses given to them is fundamental for the student to remain motivated to continue being interested in completing the course.

### **5.2.3 Category 3**

And finally, the last category involves the students who have finished MISE, category 3. In Appendix, Figure B.3 depicts the most important values for these students who have already finished the master's distance.

Students strongly emphasise that residential week has been extremely important in creating bonds of friendship between colleagues and professors. Most students attempted to choose a theme from the dissertation defined in the residential week that would be useful in their workplace or if it would fit into their professional lives.

Most of the time, students aren't aware that it is during the residential week that they can define the courses of the dissertation. The residential week is very important. Nonetheless, some students aren't able to be present due to monetary limitations, such as the cost of the trip to the venue and staying there for a while.

Some students started this studying journey considering it to be a new adventure to learn abilities;

to analyse data and also to learn new working methodologies. Students found the material provided by the professors to be very relevant. They were pleased with the case studies, the books mentioned in an excellent bibliography and above all the knowledge that was passed onto them.

Once again, it is reinforced that students ask for and expect to have more multimedia content than they actually got. Some suggestions given are to have many kinds of reminders to remind professors to respond to students' doubts. It is very important for professors to be more actively involved in their students' journeys. Otherwise, they become '*is easy to demotivate*'. As some testimonies specify '*there is a greater accompaniment*'.

## 5.3 Focus Group

In this section, the key findings of the focus group are presented, which are structured following the main parts of the protocol. These findings translate the insights expressed by most participants, and only when appropriate, we discuss some contrasting feedback. Some quotes were selected to illustrate participants' feedback.

While participants may have provided feedback using different words, these examples are meant to represent the point of view of many or all participants. We close the section with a highlight of the main recommendations provided by participants.

### 5.3.1 Participants' point of view

Some participants consider that subjects and homework would benefit if results related to the number of hours reported by all students (like the average of hours submitted per week) are shared. One student shared an example: '*If you are spending less hours in a task than another colleague, but you are both achieving the same results, it is good to understand what we can do to improve and then change some of our habits*'.

However, other participants find the information interesting, but not important for the work context, or do not even think it is useful at all, as one student explained: '*(...) I think everyone should have a self-sense of what a good job is, and they have to take the time they need to do a good job (...) I don't think people should be compared like that (...) it's not important to compare yourself to others*'. Furthermore, the lack of clearly defined deadlines was pointed out as having a negative impact a reason affecting a proper and timely submission of projects and case studies.

The majority of MISE students already work for a living. And in this context, it is often because of the fatigue from working, or because of having to devote time to the family as well. The students feel a lack of motivation to continue the course, especially in the final phase of the course. They feel a greater distance between the professor and the student. When they are developing the thesis, they feel more



alone. Since the dissertation is not a normal subject in which a test is passed and the subject is finished, the student requires great autonomy throughout the thesis period.

Some of the suggested improvements are feasible to implement developments in Moodle and other contact and communication platforms among students. Although the participants do not seem resistant to this change, other students do not feel the need. They recognise that some strategies can be adopted to simplify and facilitate this process.

In particular, the Moodle response process in the forum should be as automatic as possible and not too time-consuming. This, in turn, could increase student motivation and a willingness to submit his/her work in a timely and consistent manner.

## 5.4 Summary

In relation to a master's degree in person or in the classroom, MEIC and Master's Degree in Bologna in Telecommunications Engineering and Computer Science (METI), we have some data in the two tables presented in Table 5.3 and Table 5.1. Although it is not completely legitimate to compare classroom teaching and online teaching. We can observe that, in Table 5.3, there is an increase in 2014 students enrolled in the dissertation, so the total number of graduates also increased.

Consequently, the completion rate increased to approximately 76%. In the years 2013 and 2015, the number of graduates was around 50%. Half of the students who enrol in the dissertation subject do not complete it. In the year 2016 and 2017, it was not possible to obtain data on the total number of graduates.

The data of Table 5.1 was obtained from the University's official website. This information and these statistics are public for all students of this University. In Table 5.2, we have the number of students interviewed by categories.

As it turns out, the age of the students of the MISE is from 45 years to 64 years. These values are because this master's degree is done by older people who already have well-defined workplaces. However, they choose to do this master's degree from a distance because of the flexibility it provides and for obtaining the multi-purpose knowledge enrichment that MISE gives.

With this statistic, it is proved that this master's degree is mostly chosen by the advanced age. Therefore, it's chosen by people who already have their jobs and still have personal and professional ambitions to gain career advancement and acquisition of knowledge.

In Table 5.1, according to the obtained data, although subject to confirmation, it is clearly understood that the completion rate of MISE is around 50% in the first editions. In the first division, the total number of graduates was applied and the total number of students enrolled in the dissertation subject.

Therefore, the next rate was calculated to group only the students who enrolled for the first time for

**Table 5.3:** Numbers of enrolled students and graduates by year of MEIC-A and MEIC-T

<b>MEIC-T and MEIC-A</b>					
<b>1º Semester &amp; 2º Semester</b>					
<b>Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
Enrolled (for the 1 <sup>st</sup> time)	178	192	239	220	241
Enrolled in the dissertation	224	273	236	266	117
Total graduates	103	145	124	-	-
Total graduates/ enrolled in the dissertation (in %)	57,9	75,5	51,9	-	-
Total graduates/ enrolled (for the 1 <sup>st</sup> time) (in %)	46	53,1	52,5	-	-

**Table 5.4:** Numbers of enrolled students and graduates by year of METI

<b>METI</b>					
<b>1º Semester &amp; 2º Semester</b>					
<b>Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
Enrolled (for the 1 <sup>st</sup> time)	22	23	27	28	-
Enrolled in the dissertation	43	42	32	34	12
Total graduates	18	27	18	18	-
Total graduates/ enrolled in the dissertation (in %)	81,8	117,4	66,7	64,3	-
Total graduates/ enrolled (for the 1 <sup>st</sup> time) (in %)	41,9	64,3	56,3	52,9	-

the subjects. It has no value to use the data as a whole. Seeing that, the student had already enrolled in previous semesters. So, the values that really matter are those where students are enrolling for the first time in the dissertation subject.

In Table 5.4, the numbers are quite small, only about two dozen students enrolled for the first time in the dissertation subject. In the year 2014, there was a peak of graduates as happened in the same year in MEIC (see Table 5.3), due to a presence of some professors, the students completed their master's degrees. In METI, compared to MEIC of both campuses, it has slightly higher than the completion rate of the master's degree. It even has an average of approximately 54%, students who enrol for the first time in the dissertation subject.

In addition to the peak year, the year 2014, which also happened with MEIC-A and MEIC-T, also happened with METI. However, as the percentages were already close to 100%, there was an anomaly in the same year 2014, in the master's of METI, which exceeds 100%.

At the level of scientific publications generated by the students of the MISE, it was possible to verify that four scientific publications have been published. All scientific publications were submitted to conferences, two papers to the Iberian Conference on Information Systems and Technologies (CISTI) conference in 2017, one IEEE Conference on Business Informatics (CBI) in 2017 and finally to the conference Immersive Learning Research Network (iLRN) in 2017 as well.

Throughout the five editions of the MISE, with the 5<sup>th</sup> of the MISE taking place in the present academic year 2017/2018, was with him a total of four scientific publications, making a mean of 0.8 papers per year. A pretty good value for the level and type of teaching that is MISE.

All data obtained from these tables and the number of scientific publications generated by the students of the MISE were taken from the website of the IST<sup>1</sup>. The calculations were done in this way, as evidenced by the tables. Since it is not logical to add all the students enrolled in the first year, in the second year and some more students who are still in the third year. There are students who can't finish the master's degree in two years. Therefore, this does not make sense since the student can enrol twice or even three times, but only leaves once.

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<sup>1</sup><https://nep.tecnico.ulisboa.pt/atividades/estatisticas-ist/>



# 6

## Conclusion

### Contents

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This research presented a case study for the online master's of MISE. We have applied the CSRM research methodology, this case study addresses several points raised by students, both through interviews and the construction of conceptual maps. Also, the relevant presence of the focus group elaborated during the residential week with the students of the 5<sup>th</sup> edition. The research questions were answered through the results obtained.

## 6.1 Lessons learned

In summary, this study was designed with the purpose of finding some barriers for enrolled students to complete this master's degree, MISE. The focus is on the participation of some students who are currently in the first year of the master's degree, students who are doing the dissertation and finally students who have already completed in their entirety the master's degree. These were the three categories of students who were, interviewed.

First, and against what is recommended for focus groups, we were only able to conduct a single session with all participants. Even from the group of 27 people, only around 10 people participated during the whole session. This means that some findings might have been lost by not gathering the whole group's feedback.

With the case study carried out, based on qualitative data collected through interviews with NVIVO 12 software and conceptual maps. We presented some topics and factors of a master's degree online. There are advantages and some of the problems presented by students throughout this case study.

We present also on the basis of the work done by other researchers in diverse contexts, whose factors, questions and motives are related to the success of distance students. It's important to understand the influences that can lead to the success of these students.

The DE and other platforms and technologies remain important to mobilise the XXI century. Will the number of students and courses/master's online increase? Yes, certainly yes. Some students said that it would be beneficial to have a master's mentoring system in order to help new students entering the course. This system could indeed provide adequate training and support for students' development in this important and rapidly growing online area. The evidence would suggest that they are not useful, or at least until now in this course.

As a pointer for what is needed, [67] recommend that: *'Training programmes for online tutors need to provide an experience of online learning and teaching. It is supported and mentored by experienced facilitators so that online teaching and learning practice are of a high quality and positively benefits all the stakeholders involved'*.

This study has shown that distance learners can perform as well as or better than traditional learners in the management of technology master's degree programs, as measured by exams, term papers, and

homework assignments [68].

Moreover, the distance learners in this study were observed to gain much more than a traditional education from their experiences. They gained a broadened network of valuable colleagues, skills in working with others and collaborating across distances, and many social skills beyond those offered by traditional classroom settings. However, as in other studies [69], the results reported here suggest that successful distance learning requires an extraordinary commitment, a high degree of maturity and high motivation from the student. Considering this case study it can be concluded that the MISE can be considered a successful case within distance learning.

MISE should be considered a successful master's degree for several reasons: the number of candidates, the quality of students; the percentages of conclusion, the degree of satisfaction, the management model; coordinating team, and professors who teach in MISE. In particular, the percentage conclusion of MISE (for lower than face-to-face master's degree) is higher than the percentages of other similar courses. Although students' satisfaction with MISE is also the results of the survey.

In this study we present a summary of the first five years of MISE, highlighting the key results in terms of candidates, students, and graduations. In the context of distance masters, where almost all students work, and so the time the completion time is longer (four years in average) and (also for the completion rates are lower, the MISE can be considered a case of success - more than it is not, in distance learning.

On the other hand, the fact that it is offered jointly by the two schools (alternately) with cultures, structures and procedures require a huge administrative effort by coordinators and secretariats. In addition, in educational terms, the MISE (based on the virtual pedagogical model of the UAb) begins to be outdated, especially when compared to video-based MOOCs.

Finally, this study intends to achieve the objective of being able to respond to all research questions. To achieve this objective, it is necessary to check the answers of the students of the following editions of MISE and then analyse their data. We did several interviews and surveys trying to figure out and identify which of the main factors that most influenced MISE.

In summary, this master's degree has a tendency to grow in the coming years. It will be necessary to investigate and ensure the same by giving the respective answer both at the level of the available platform and of the faculty.

## 6.2 Discussion

Notwithstanding, the small set of participants was very active and engaged in the discussion and showed interest in the themes discussed. Participants had a different point of views regarding some themes, but the group was rather homogeneous. Assessment continues to be one of the most limiting factors in this part of education. Faculty should be able to analyse and recognise levels of knowledge and/or obtain



ways to know what knowledge was acquired.

At present, 56 students are enrolled in the online master's degree of MISE, in the current academic year 2017/2018. In all editions, a total of 230 students were enrolled, who enrolled for the first time in this master's degree. Those students who are enrolled in the dissertation subject, in the previous editions since the current edition are still in the first year. The dissertation discipline belongs to the second year of the master's degree; a total of 96 students.

To conclude, the total number of students who finished the master's up to the precise moment that is, in the first three editions, were 22 students. In addition, the 4<sup>th</sup> edition of MISE is currently in the second year of the master's degree and the current edition, 5<sup>th</sup> edition, is facing first-year students.

Comparing tables such as: Table 5.3 and Table 5.4 that both MEIC and METI, have many more students and in turn a rate that even then approaches MISE. In the last five years of the MEIC, 1070 students enrolled from which only 372 graduated. However, despite not having data for the year 2016 and 2017, which are in the current year of 2018 and 2019, they're about finished. It is easy to see that these values are relatively low. Only half of those who start their master's degree in computer science and computers at *Instituto Superior Técnico* complete.

Analogously for the students of the master's degree in telecommunications and computer science, in Table 5.4 we find many lower values of the students who enrol to start the master's degree. Following the same reasoning, from the year 2013 to 2017 we find 100 students enrolled in the master's degree. Of which 81 students successfully completed their master's degree.

According to Rostaminezhad et al., They analysed a number of drop-out reports in online courses [70]: for example, at Open University UK, 35% dropout rates were reported before submitting the first assessment, according to Smith [71]. In the case of Yukselturk & Inan [72] in Turkey of 36% and in the United States, Park & Choi [73] refers to a 54% withdrawal, with an average abandonment rate of 40%. MISE registered a drop-out rate of 28% after enrolment, which puts it in a rather good position compared to that average.

This study resulted in a deeper understanding of the factors influencing students' motivation in master degree in MISE which were presented and discussed throughout this case study. These findings should be further considered, starting from the recommendations that can be improvements with limited effort or costs. There are some factors related to the progress of MISE of the focus group session that is worth discussing.

### **6.3 Limitations**

We have encountered some limitations in obtaining data from other universities, so we can make some comparisons between master's degrees online. We have contacted several universities in the United

**Table 6.1:** Number of universities contacted

<b>University</b>	<b>No reply</b>	<b>Negative answer</b>	<b>Uninteresting answer</b>
Arizona State University Online		x	
Fort Hays State University Online	x		
Georgia Institute of Technology		x	
Illinois Institute of Technology			x
Liberty University Online	x		
London School of Business and Finance	x		
North Carolina State University		x	
Saint Leo University Online	x		
Sam Houston State University Online		x	
The Open University UK		x	
University of Alabama Bama by Distance	x		
University of Birmingham Online		x	
University of Edinburgh	x		
University of Florida			x
University of Glasgow		x	
University of Liverpool		x	
University of Manchester			x
University of Massachusetts Lowell	x		
University of Melbourne		x	
University of Memphis UofM Online	x		
University of Missouri Mizzou Online		x	
University of Nebraska Lincoln			x
University of Oxford	x		
University of Pennsylvania		x	
University of Southern Queensland	x		
University of St. Bonaventure		x	
University of Utrecht			x
Uppsala University in Sweden			x
Wageningen University	x		

States, the United Kingdom and Australia, but all of them unsuccessfully. This is because they do not want to share their internal faculty data and make them public. These data may not be the best within the parameters presented by enrolled students and those who complete the master's degrees online. During this research, there were some limitations such as the failure to obtain or find statistics on completion rates in distance masters.

We sent data to various universities without any success, some of them are represented in the table 6.1. With some of the universities contacted not responding, others sent a negative response. Saying that they could not give this data since it was internal data of the university itself. And others who replied that answered with template answers, to say what courses exist in that college, for example. In other words, these responses received have no strict interest at all.

They answered that they could not give this data because it was private data and that only the university belonged and the students. Or because the respondent was not allowed to give this information and forwarded information to another person, but then never again received another response. Unfortunately,

it is an information gap in the development of this research.

## 6.4 Communication

In this Section, the last stage described in Section 1.2 is presented in Section 1.2.6, in step 6, the preparation of the report and its publication in the scientific community. Where we intend to submit this report of the case study at conferences or journals within the area of education, in order to share this research with the community.

As stated in CSRM, our research must be exposed to the scientific community as results, and lessons learned might have relevance to others. Under the scope of this research, we produced one paper with the goal of exposing results to the scientific community.

The journal with our work in it has been submitted to the scientific community was the **Open Learning: The Journal of Open, Distance and e-Learning** journal in the UK. This journal is the leading international journal in the field of open, flexible and distance learning. The journal is widely subscribed to and read throughout the world by those in specialist distance education institutions.

Furthermore, by those using distance, flexible and technology-based forms of learning in conventional education and training contexts. The scope of this case study is very relevant to this journal since it is within the medium in which the journal fits.

## 6.5 Future Work

We believe that this thesis was a first step to register this online master's degree, the MISE. That we can consider a master's degree different from the other master's degrees since there are no classes. So it uses an innovative approach to education, and in the area of education that is changing.

For future work, we will continue our investigation, do research with the focus on research in the focus group. to perceive in a much more active and present way the key points of each student relating to online teaching [12].

In particular, the success and failure of students regarding online education [12] and the success rates of the master's degree in MISE. Likewise, deepen our knowledge within the area of distance learning. In these models, which are increasingly used both in universities and companies to train their employees or students.

MISE can and should position itself as a master's degree to form of senior professionals wishing to take advantage of the enormous opportunity that represents the digital transformation of organisations. Also, the fact that MISE is already taught at a distance allows its evolution to new pedagogical methods, particularly video-based ones. Based on these data and in the literature, for future work, we ask the

following question: why has there been more than five years of an online master's degree in IST like MISE and no other similar courses have been created yet?

The creation of a new master degree would also be relatively easy. Finally, there are still opportunities for growth in other Portuguese-speaking countries. This type of research is ever more important since most universities are now investing in distance learning.

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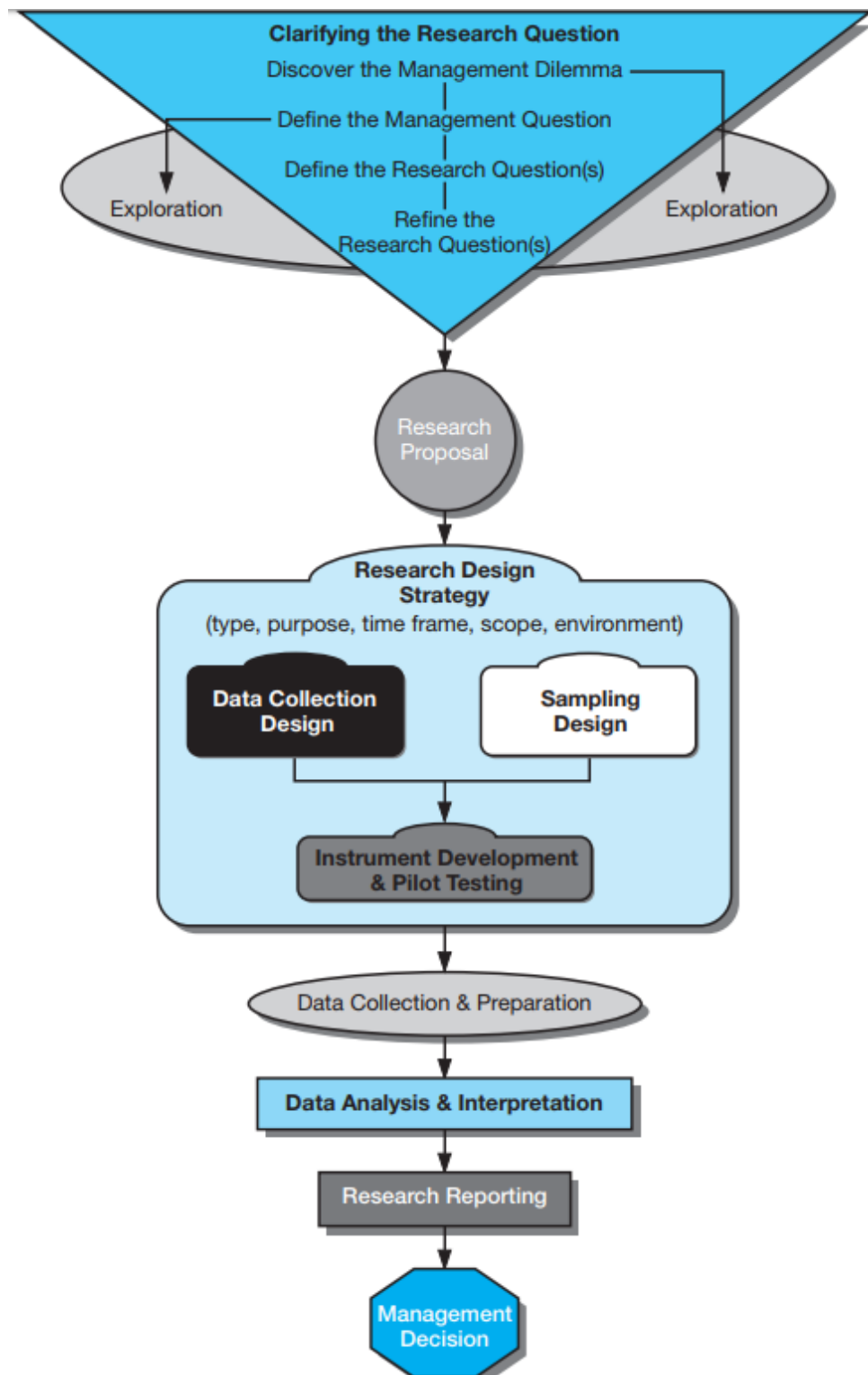


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## **Appendix A**



**Figure A.1:** The schematic methodology of a case study according to CSRM (from [6])

# B

## **Appendix B**

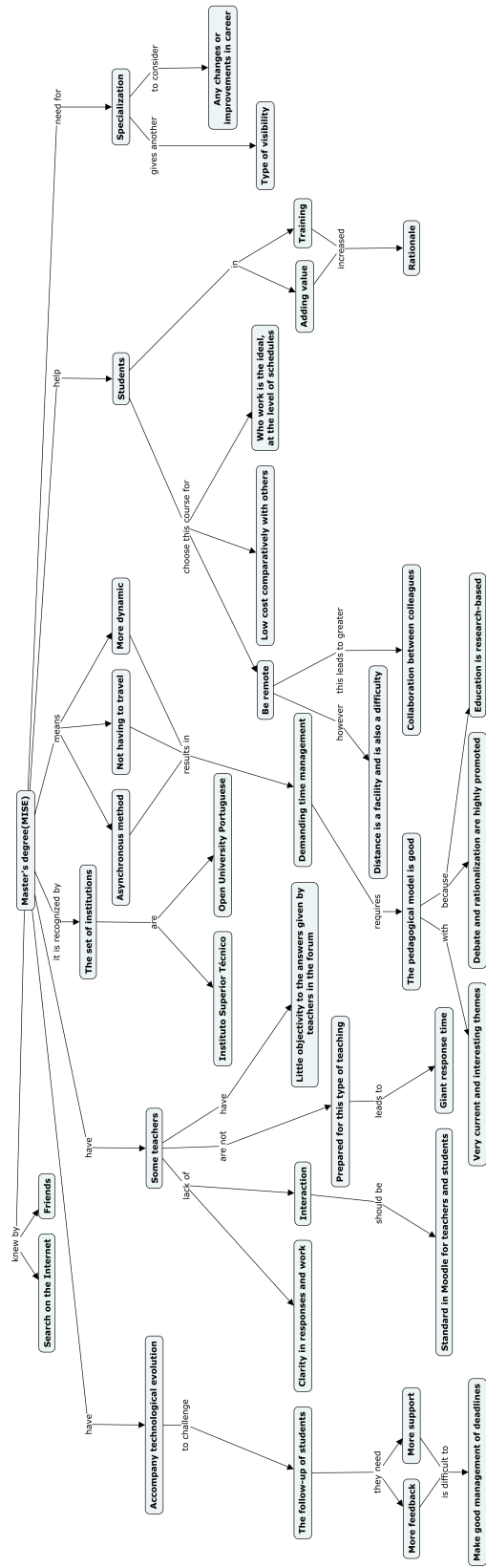


Figure B.1: Conceptual map of students who are currently in the first year and are doing the courses



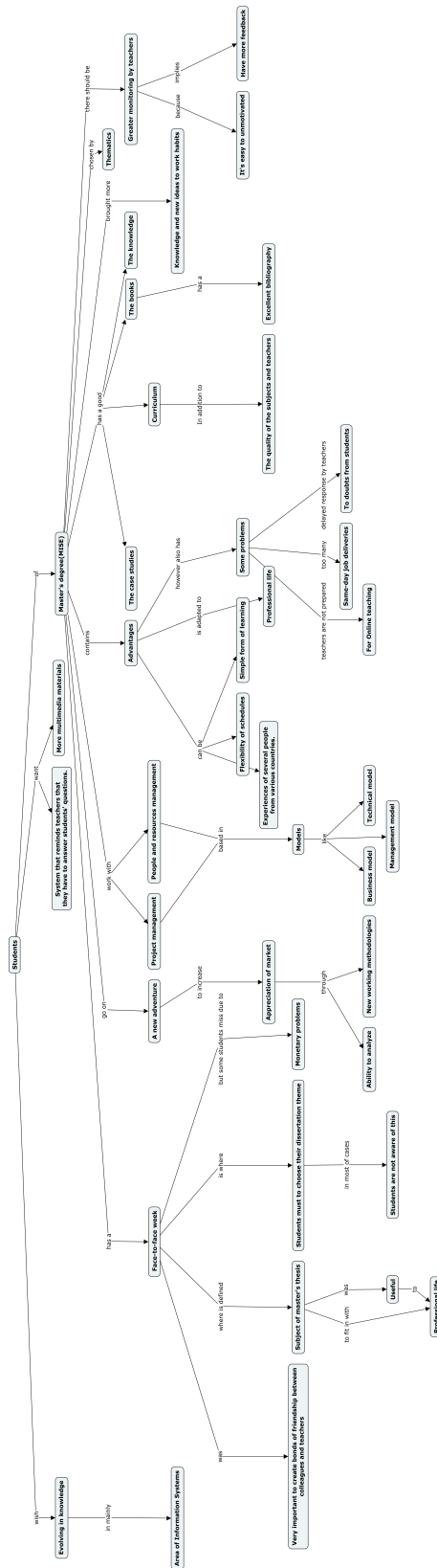


Figure B.3: Conceptual map of the students who have already finished the master's degree, the MISE



# C

## **Appendix C**

## **MISE students**

### **Survey - MISE**

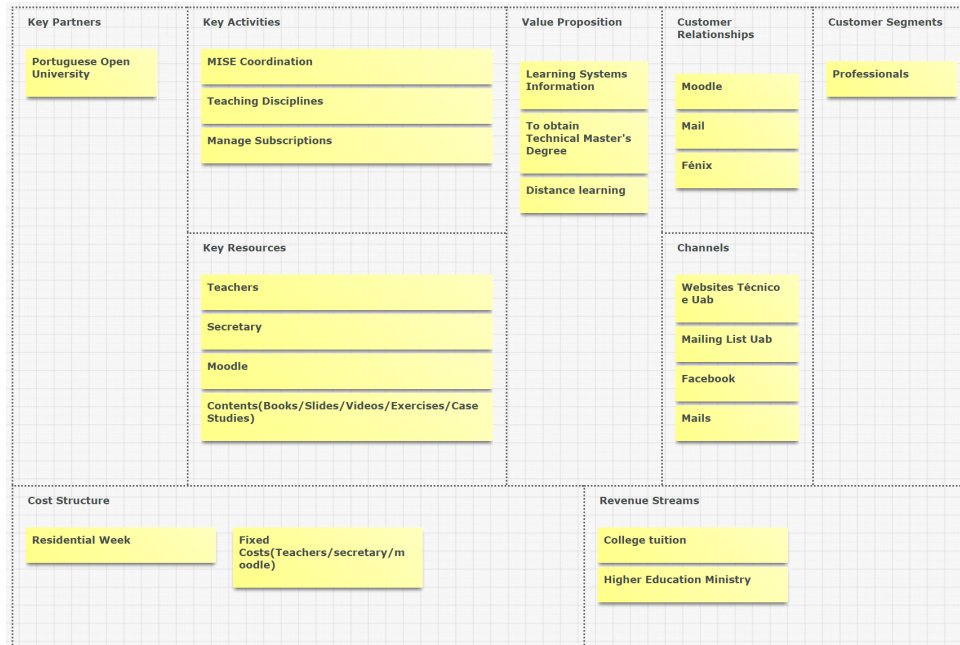
(The data in this interview are completely anonymous and the data will only be used for statistical purposes in this Master Degrees (MISE Case Study).

1. What is your age? (Under 18/18 - 24/25 - 44/45 - 64/Over 64)
2. What is your gender? (Male/Female)
3. What is your Nationality?
4. What is your geographical location? (Within the Lisbon Area/Outside the Lisbon Zone/It is outside Portugal/Lives outside of Portugal)
5. If it is outside Portugal, which country?
6. What is your area of study? (Area of Sciences/Health Area/Area of Technologies/Areas of Agriculture and Natural Resources/Areas of Architecture, Plastic Arts and Design/Areas of Education Sciences and Teacher Training/Areas of Law, Social Sciences and Services/Areas of Economics, Management and Accounting/Humanities, Secretarial and Translation/Physical Education, Sport and the Arts)
7. What is your current professional situation? (Permanent/Part-time/Unemployed/Self-employed/Student/Retired)
8. [QA] How did you learn about this online master's degree, MISE? (Yes/No) (Internet/Friend)
9. Did you complete the master's degree, i.e. doing dissertation as well? (Yes/No)
10. [QA] What is the reason for this master's degree?
11. [QA] Did it meet your expectations?
12. [QA] If not, what was the main reason you did not finish your master's degree?
13. [QA] What did you like most about MISE?
14. [QA] What do you dislike about MISE?
15. [QA] Would you recommend other people and why? (Yes/No) (Definitely yes/Probably yes/Do not know/Probably not/Definitely not)
16. [QA] Do you like the collaborative platforms and material made available? (1-5)
17. [QA] How important is the face-to-face week? Why?
18. [QA] What suggestions do you give in the functioning of the chairs, in the materials made available, in the Open University platform and in its pedagogical model, and the entire application process, the submission of dissertations and inscriptions or what could have been done to improve?

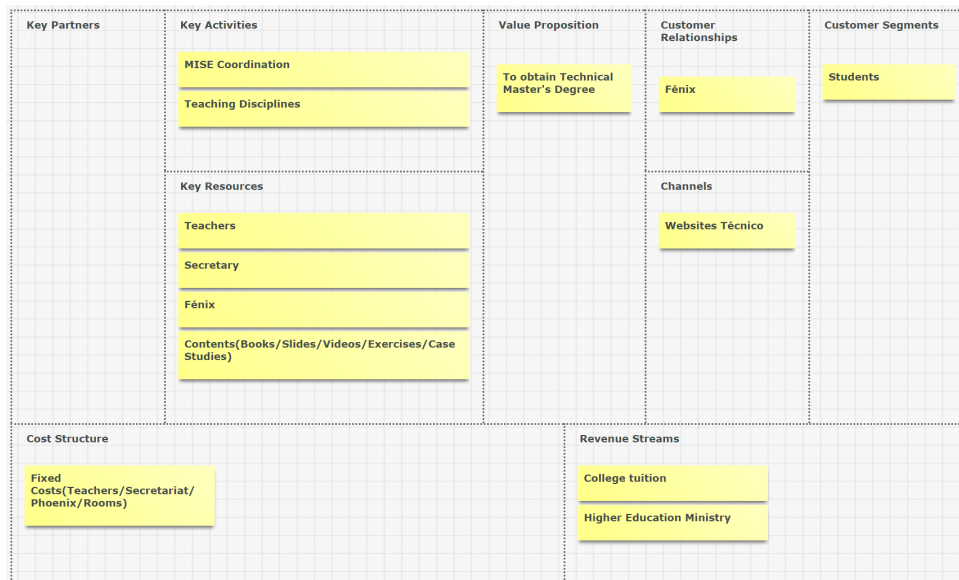
Thanks for your collaboration

D

**Appendix D**



(a) The Business Model Canvas relative to MISE



(b) The Business Model Canvas relative to MEIC

Figure D.1: Business Model Canvas of MISE and MEIC