Identification and analysis of indicators for the coordination of higher education programs in the context of e-learning

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Abstract

In the current panorama, most universities are using LMS with other co-related operational systems to manage and monitor academic programs generating big quantities of data. With the necessity for proper information to analyse clearly and concisely academic programs, and all related tasks, inherently performed by program coordinators, directors and/or program chairs, it was necessary to select and extract focused indicators to support manageability, monitorization, and also to support decision making.

With this rationally, this work surveyed the literature to extract, identify and select major indicators (or key performance indicators, KPI) which can be used to model a decision-support system to help academic program coordinators.

The primary research question was "What indicators are relevant to support the coordination/direction/chairing of higher education programs in the context of e-learning?". It was pursued via a Systematic Literature Review that analysed current studies and theoretical background consolidation focused on establishing what these roles are and what roles they serve. I.e., what a program coordinator, director or chair does, allowing to build sufficient knowledge to answer the research question.

The extraction, selection, and analysis of the literature dataset determined 26 indicator themes relevant to support academic programmes within the e-learning context which were mapped with the theoretical background. This enabled an identification of the current alternatives to build decision-making tools for these professional roles, but also highlighted gaps in the literature, for which innovation and research are necessary, towards creating new systems to support the academic program coordination role and its main roles.

Keywords: Learning indicators; program coordinator; program chairing; program director; learning analytics; academic indicators;

Resumo

No panorama atual, grande parte das universidades utilizam LMS em conjunto com outros sistemas operacionais para gerir os cursos académicos e serviços associados disponibilizando grandes quantidades de dados. Para que se possa analisar e supervisionar de uma forma clara e concisa os cursos e todas as funções inerentes ao coordenador ou direto de programa do ensino superior, é necessário selecionar e extrair esses dados que os LMS fornecem para apoiar, não só na gestão e monitorização, mas também no suporte à tomada de decisão..

São extraídos, identificados e selecionados os principais indicadores através de uma Revisão Sistemática da Literatura que poderão ser utilizados num painel de instrumentos cujos indicadores possam ser mostrados em tempo útil para que possa dar auxílio aos coordenadores de cursos do ensino superior.

A questão central de investigação é "Que indicadores são mais relevantes para apoiar a coordenação de um curso de mestrado em contexto de e-learning?", e foi conduzida uma revisão sistemática da literatura para a análise de estudos existentes e consolidação de conhecimento com base em fundamentação teórica relacionada com os coordenadores de curso e suas funções nascendo desse processo conhecimento necessário para lhe responder.

Para concluir, foi possível extrair, selecionar e analisar toda a base de dados científica que ajudou a determinar 26 diferentes temas de indicadores relevantes para o e-learning distribuídos por 5 categorias pela revisão sistemática da literatura com o mapeamento do contexto teórico inicial para determinar o que é um coordenador de programa académico e quais as suas principais funções.

Palavras-chave: Indicadores académicos; coordenador de curso; coordenador de programa; coordenador académico; director académico; indicadores académicos;

"Education is the most powerful weapon
which you can use to change the world"

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Abbreviations and Symbols

SLR	Systematic Literature Review
LMS	Learning Management System
KPI	Key Performance Indicator
PT	Portugal
UK	United Kingdom
USA	United States of America
AUS	Australia
RQ	Research Question
UAb	Universidade Aberta
LA	Learning Analytics
AE	American English
BE	British English
RSL	Revisão Sistemática da Literatura
GPA	Grade Point Average

Chapter 1 – Introduction

Individuals performing program coordination tasks take on different role names, and different levels of responsibilities, regarding the several tasks and roles that must be performed, depending on their institutional locations around the world. In general, it's correct to say that they will be a program coordinator, or program director or program chair, and have similar roles (or tasks) related to program management and administrative tasks depending on their university [1]–[19] (this is detailed in chapter 4, as part of keyword analysis). One of the major common roles is to establish the enrolment of students in the program, provide proper communication on when needed and mitigate program obstacles that might happen during the academic year. They assess and monitor the entire program, trying to prevent student breakdowns as individuals or groups.

This chapter includes a background description on section 1.1. On section 1.2 we can find the motivation to pursue the problem and in 1.3 is specified the intention to achieve the final goal and of the final section of this chapter presents the entire document organization.

1.1   Background

It is up to the Program Coordinator/Chair/Director to support the success of all the students during entire academic program [1]–[19] with the ability to provide any necessary aid related to its roles. Coordinating an academic program relies on the monitoring and tasks related to individuals, groups or all students and stakeholders like lecturers and administrative staff all along entire learning process with the major objective of cooperating in the prevention of program failure.

This study refers mostly to a single main research methodology that is going to be implemented to obtain the final goal and answer the research question "What indicators are relevant to support academic programs coordination in the context of e-learning?". The Systematic Literature Review is the methodology chosen to gather, extract, analyse and provide proper information to reach this study goal and it is described in depth in chapter 3 of this document.

Chapter 2 describes the research problem and motivation where the main issue lies on the lack of feedback or support to academic program coordination. That gap is related to their administrative and non-administrative roles where nowadays, with all the information generated by information systems, it is imperative to extract that information and find the best indicators to fulfil this gap and support the program coordination stakeholders, mainly the program coordinator, director or chair.

Chapter 4 provides a theoretical background with the current terminology on what is program coordination, how individuals performing this role are called and what are their main roles or tasks. This background cross-references sources from 4 distinct countries: Portugal (PT), United Kingdom (UK), Australia (AUS), and the United States of America (USA).

As mentioned above, this document presents a systematic literature review in order to organize and extract an entire a set of scientific studies with the objective of answering all the proposed research

questions, in particular, "What are the indicators known to support the academic program coordination?" and "Are those indicators relevant to the e-learning context?".

We concluded this work by answering the major research question based on the first 2, "What indicators are relevant to support the coordination of higher education programs in the context of e-learning?" and specify generic limitations and future work, as shown in chapters 6 and 7.

1.2 Motivation

This thesis has a motivational personal nature, starting on the data gathering and analysis and education. The evolution or technology disruption must be used to facilitate all type of process that can or cannot be repetitive used to enhance the decision-making quality, impacting that way, directly or indirectly, teaching and research quality.

More and more, systems must be integrated to fulfil daily life problems that people can find, in this case is in terms of management of academic programs focused on program coordinators.

Therefore, by gathering, selecting and analysing the major indicators, enables the "privileged" access to proper information in due time for those indicators to be shown and proper decision making can be implemented on time. This means that Program Coordinators can have more efficient time and focus what really matters for their role, program success and the smooth running of the whole program and academic year for all the stakeholders.

1.3 Objectives

The main objective with this study is to identify the most relevant indicators to support the management and decision-making for program coordination of higher education in the context of e-learning. This process includes the exploration, identification and analysis of what is the role of program coordinator, in Portugal, USA, Australia and UK, and also their main tasks or roles associated to decision-making and relevant information to support those decisions.

It will be taken into account the liability of how and where to find those indicators and the possible limitations behind to obtain that type of data (regarding current information systems and possible data extraction from LMS). As it is, to reach that goal, two research question have been developed to answer the main central RQ as it is possible to view on the table below:

RQ 1	**What indicators are relevant to support the coordination/direction/chairing of higher education programs in the context of e-learning?**
RQ 1.1	What are the indicators known to support academic program coordination/direction/chairing?
RQ 1.2	Are those indicators relevant to the e-learning context?

Table 1 - Research Questions

Picking up the case of Universidade Aberta (UAb), the online system is based on Moodle and it contains information focused on student support and lecturer. This information is segmented by course unit or by student itself, thus this information is not automatically tapped by program coordinators as it could in an efficient way, or they may not even know in what information should they focus or extract.

Since the data is not prepared to support coordination systems, or even because the available indicators don't meet the requirements of program coordinators' tasks, they may not be able to rely on visual interaction or any advanced analytics approach to help on their roles.

The use of a Systematic Literature Review (SLR) serves as agglomeration and contextualization of information that, by including the known and available indicators in other studies [20], was used to answer research questions RQ 1.1 and RQ 1.2 and, it turns out, that we can achieve the main goal of responding to RQ 1.

To conclude, this study enables the possibility to extract and transform focused and necessary information through the available systems for other studies and practical environments and also availability to evaluate the current background in some universities to develop a proper prototype because it's with the exploration of new solutions, improvements in LA and visual dashboarding to academic program coordinators that's possible to actively contribute to science investigation by answering "What indicators are relevant to support the coordination of higher education programs in the context of e-learning?".

1.4   Document Structure

Beyond the introduction, 6 more chapters build this document. It can be observed on section 2 the initial problem discussion and its approach to solve it, after that it is specified how the problem and approach will be conducted with its methodology definition on chapter 3. Defined and characterized a Systematic literature review, it is available on chapter 4 the entire theoretical background that serves as a baseline to be able to cross reference between what is a program coordination and its main roles. After assessing, it is time to perform in chapter 5 the systematic literature review with all the extraction criteria specified previously to be able to answer the first research question and on chapter 6 we have the discussion and results where it's answered the 2nd research question. To conclude the document, it is possible to observe the limitations, conclusions and future work on chapter 7.

Chapter 2 – Problem Definition

In this chapter "Problem Definition", it's going to be defined what's the main problem and characteristics. Also, it's on section 2.1 that's going to be stated and explained, then a small approach to resolve the problem is itemized on section 2.2.

2.1   Problem Statement

With the increase of data/information quantity being generated by LMS, most of the information is not well structured or too dispersed regarding educational events generated by interaction, direct or indirect, that can't support the management of academic programs or even because they can't even know which indicators should be followed and to be useful to their function and task support.

This said, the cause of the problem, most of the times is to know what a program coordinator is, how they're currently called and known, what are their main tasks and roles. With that, we can consider an initial focus to gather and pursue in terms of information to know where to attack, is this case, indicators to support the academic program coordinators.

2.2   Problem-solving approach

To solve this definitional issue, there are many approaches possible. In this study is possible to have an overview on what is an academic program coordinator, how is it called in different countries and what are the main functions for that role(s).

As referred on the section above, this is an initial process to focus on what's important, what indicators we can consider supporting this role and if they're relevant to e-learning programs. With this, gather information, extract, and evaluate through a systematic literature review is imperative to start and consolidate a great process to communicate the results with the interested scientific stakeholders that are searching for solutions regarding learning analytics in higher education.

Chapter 3 – Methodology

A researcher designs systematically a study that presents liable and valid results to close objectives and, in a certain way, create knowledge through the identification, selection and evaluation to answer a clearly formulated question. In this section, it's possible to overview the methodology used in this dissertation, in particular a Systematic Literature Review.

3.1   Systematic Literature Review

For this project, a systematic literature review was made. This SLR enables an identification, analysis and interpretation of all the information related to a specific question, topic or area using a detailed and severe methodology [21]. It also enables the extraction of information of other scientific studies or relevant works with the objective of obtaining liable results and objectivity.

This SLR was performed based on the articles "Procedures Performing Systematic Reviews" [21], "A Guide to Conducting a Standalone Systematic Literature Review" [20] and "Achieving Rigor in Literature Reviews: Insights from Qualitative Data Analysis and Tool-Support" [22] where is based upon 3 major phases, planning, conducting and communication.

Under the planning phase, is shown the necessity of doing the systematic review that summarizes all the information about a specific theme or scientific field where the research questions, the objectives and all the inclusion and exclusion criteria are essential to entire revision protocol. Regarding conducting phase, revision protocol is applied in action previously prepared to obtain studies that contains useful and relevant information to the objective of the SLR.

Finally, being the communication the last phase, this has the writing and exposure of data, insights and information extracted and analysed by the selected studies as the main goal in order to conquer specific goals of the literature.

As represented on figure 1, all the 3 major phases described above in a summarized way to show the majority of the tasks related to each phase. It was covered previously the Planning phase on section 2 where the problem and research questions are identified. Next, it is performed the conducting phase on section 5 to search and extract useful information to be evaluated and support the research question answering. To communicate the results it is possible to observe on section 6 where the indicator themes are identified. This SLR was made with a concrete base and used in many scientific studies that enables the synthesis of existing projects and developments in terms of Learning Analytics, including, the discovery and analysis of the most relevant indicators to the coordination of academic programs in the context of e-learning based upon respective methodologies used on the diverse studies/papers with the goal of answering all proposed research questions.
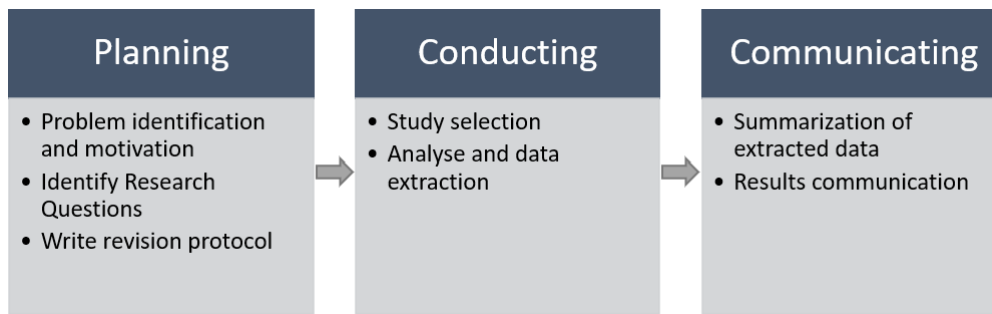
Figure 1 – Systematic Literature Review main phases [21]

Chapter 4 – Theoretical Background

In this chapter, several concepts regarding program coordinators are specified in order to introduce and describe the main notion to explain why the research problem exists, in this case, the lack of indicators for the coordination of academic programs.

4.1   Nomenclature and characteristics of a program coordinator in the Portuguese context compared to USA, UK and Australia

With the evolution of technology, universities are using tools and advanced systems to operationalize and support, in general, administrative, and non-administrative activities with LMS that enhances academic programs management. Thus, e-learning and hybrid approaches like blended learning are increasing and with the evolution of these systems, it's necessary to evaluate them properly and realize if they're working properly and efficiently [16].

Regarding all the turbulence around technology, Learning Management Systems started to have impact in the society and all stakeholders related to learning, improving education levels and institution management. Their utilization in higher education is common regarding management activities [19] and with the interoperability of other systems with similar or disparate functions to education, like billing, accountability, finance, and others [19], to do data crossing using these "new technologies" and gather data insights.

Since the 1980s, it is being identified that higher education levels have been changing during the years regarding the appearance of, more and more, new distance learning programs (Liebowitz & Frank, 2011). But with the capacity of having everything with the distance of a click, online and on the cloud, e-learning approaches and many other hybrid variations of education have been growing, leveraging the paradigm of modern education, changing the previous model of academic education (Sun, Tsai, Finger, Chen, & Yeh, 2008; Wang, Wang, & Shee, 2007). Therefore, is important to measure the success of the LMS to reach proper conclusions of cause/effect and create value propositions in decision operations and manage institutions investments (DeLone &McLean, 2003) [18]. With this, is important

to characterize the individuals responsible for the academic program coordination (and courses) among universities and clarify the differences between several countries worldwide, in the case of this thesis, it's focused the comparisons between USA, United Kingdom, Portugal and Australia regarding assigned roles, functions and tasks.

4.2   Role comparison between Portugal, United States, United Kingdom and Australia

In Portugal, the functions to the role of an Academic Program Coordinator arise from general country regulations and each university regulatory statuses or constitutions, so to speak, not all are the same. Each university have their approved regulation in the Portuguese official gazette [3] where it can differ the tasks or functions for the role but they all have in common the main goal of the good management wellbeing of academic programs and it's normal operation ensure its quality [1], [2], [4]–[7], [12].

In the table 1 is possible to notice the declared and stated functions by the manifests published In the Portuguese official gazette for five different Portuguese higher education institutions, namely from Instituto Politécnico de Santarém [12], Universidade de Lisboa [6], Universidade de Coimbra [4], Universidade Aberta [2] and the Faculty of Engineering of the Universidade do Porto [1]. It is possible to observe, in more detail, the functions characterized for each university mentioned above resulting from the regulatory statuses in the appendix 1 – Program coordinators responsibilities.

Roles	IP Santarém [7]	U. Coimbra [4]	IST / U. Lisboa [12]	UAb [2]	FEUP U.Porto [1]
Ensure fulfilling of goals defined for the program, considering criteria for scientific and pedagogic effectiveness and efficacy	x	x	x	x	x
Represent the program at the institution's governing bodies	x	x		x	x
Contribute to adequate program operations, specifically by coordinating the courses syllabi and their academic activities	x	x	x	x	x
Propose the creation or cancellation of courses	x	x	x	x	x
Propose and comment on changes to the program's course listing	x	x			x
Draft proposals for staff hiring, and contract renewal or rescission.			x		

External promotion of the program and coordinate the organization of application processes	x			x	x
Draft an annual report, following models defined by the Scientific/Pedagogic Council of the institution	x		x		
Perform lecturer performance assessment	x	x	x	x	
Develop communication channels with students, towards permanent information update and exchange of viewpoints		x		x	x
Assign vice-coordinators/chairs/directors to assist in the coordination roles		x	x		x

Table 2 - Program Coordinators Roles in Portugal

In terms of research, it's found differences between "Program" and "Programme" to further investigate "Program coordinator" or "Programme coordinator". This designation varies by country and it is merely because it is commonly used on a specific country derived by its grammatical and spelling foundations. In this case, we can verify that the English from USA uses the word "Program" and the British English uses "Programme" since they use "Program" to specify, for instance, materials or software or even scheduling of events/shows. Consequently, in Australia (Australian English) it is recommended the use of the expression "Program" as the official denomination but is still present expressions similar to British English (like "Programme") [15].

That said, we can now move forward to the activity functions or roles that are considered relevant and selected as a background for this study in the sense of understanding what are the functions and what type of functions [17] a program coordinator have in a foreign country (USA, UK and Australia) enabling the general role framework and main responsibilities. First, we found the main roles for each of the named countries in this study as it's possible to observe in the table 3:

EUA (AE - American English)	*Program Coordinator* *Program Chair* *Program Director*
Reino Unido (BE – British English)	*Programme Coordinator* *Programme Chair* *Programme Director*
Austrália (AE – American English)	*Program Coordinator* *Program Chair* *Program Director*

Table 3 - Nomenclature analysis for program coordination in US, UK and AUS

In relation to Coordinators, USA regulations points more to a secretary and administrative function than a proper "Program Coordinator" in Portugal and have a rank E04 wage [14] that leads to a relatively low for USA which concludes not to be the perfect fit for the same role here in Portugal (with different and lower responsibilities) and also if it has a salary it is a full time job and not a function provided by a Professor, and it's important to mention that it requires only a bachelor degree with a commonly technical profile and not a coordinating Professor profile (appendix 1). In several role descriptions of universities recruitment processes it states to be an administrative role [4], [5]. In the case of UK and Australia, the same happens and it can be found many administrative functions and project management tasks derived to the direct report to "Program(me) Manager", also it's not necessary to be a Professor and has a basic technical and functional profile [1], [6], [7], [15].

As a second perspective, in the USA, the role for Program(me) Director reports to the "Department Chair" (Department director) and as opposite to the previously referred "coordinators", this needs to be a full time auxiliary Professor "A candidate for the position of Program Director must hold full-time faculty status and at least the rank of assistant professor at the time of appointment" [13] and has functions similar to the program coordinators/directors in Portugal [12] with a mix of administrative and program coordination components, in this way, we can reference this as a mixture between program coordination and administrative assistants in Portugal. In the UK and Australia, these directors collaborate mainly with the board director (program chair) and has to be highly qualified for the role (Professor or Doctorate) and also cooperates with administrative tasks in the field of quality management of academic programs, in other words, they help in the academic analysis but usually reports to the department chair or, as mentioned before, the program chair. [11], [13].

The following search was also the Program(me) Chair who are mainly Committee Presidents in events and conferences (for USA), distinguished by Department Chair and Program Director "In some sub-units, program directors will perform the same functions as a department chair, but typically for a smaller number of faculty/staff/students. Generally, sub-units with eight or more full-time faculty will be given department status and will be led by a department chair. Academic units with fewer than eight full-time faculty will be given program status and will be led by a program director." [11]. Nevertheless, for the UK it's not possible to find many of this type of examples and more for Program(me) Director since when they're nominated Chair, they tend to have some administrative/executive functions where the Program director tasks are induced [10].

In Australia, the references are reversed, and it is possible to obtain answers where this role reports to Dean or Department Chair [8], [9]. In general, it is plausible to observe in the appendix 2 the set of functions between the mentioned roles grouped by geography (USA, UK and Australia) and also do a collective comparison of functions to understand which are the functions that can be applicable in the administrative context, and which are the ones that can be endorsed as functions of an academic program coordinator as we can analyse under appendix 3.

To conclude, it's possible to clarify that Program(me) chair has the plausible characteristics (most favourable) and similarities to a Program(me) Coordinator in Portugal but there's almost no information

about the role itself, however we have also Program(me) Director as second choice since it reflects the proposed main functions for the role but start to have much more administrative duties than executive or management ones. Last of all, Program(me) Coordination in the USA, UK and Australia refers to a much more administrative role than a Program Coordinator in Portugal so, in this study, its prioritization in terms of searching roles are Program(me) Chair, Program(me) Director and then is Program(me) Coordinator. In table 4 it is possible to observe the roles comparison between foreign countries:

Overview	EUA	UK	AU
Program(me) Coordinator	Administrative Role	Based on USA, this role is more administrative and operational support and it's not held by a professor. It reports to Program manager or Dean depending on its functions	Similar conclusions to USA and UK, too administrative.
Program(me) Chair	Function that seems to be closer to a program coordinator in Portugal	In the UK the Program Director is more commonly used among these roles. Since when they're nominated chair, they end up being responsible for some administrative tasks where Program Director ones are included	This role is not normally applied to a single individual. They usually nominate someone from the academic board or a chair to have those functions (of course with boundaries and or departments, faculties). In sum, each chair has their own responsibilities and one of them is the Program Director component.
Program(me) Director	Does not have the same autonomy that a chair has and have some administrative duties like a program coordinator	"The academic member of staff who provides academic leadership and direction to the programme and is responsible for providing support to the Programme Lead to achieve the aims and learning outcomes for the programme at the branch campus." Although it has some administrative and executive functions, they need to be Professors or Doctorates that should understand the role pretended for this study	Same as USA and with some functions similar to the UK

Table 4 - Coordination Roles per Country

As a baseline for this study, the initial search and background around this theme, what is program coordination and it's functions, led us to a research on statutes and law articles published by the Portuguese higher education institutions, in particular, Instituto Politécnico de Santarém, Universidade de Coimbra, Universidade Aberta and Instituto Superior Técnico, a faculty-level unit of the Universidade de Lisboa. With those statutes is possible to verify that the Program Coordinators/Directors tend to have the same level of functions where the focus relies on the academic program development and contribute to the proposed learning objectives to guarantee its entire well-functioning and quality during the academic year, programs and courses. Therefore, we can conclude that, comparing the Portuguese

universities and the foreign ones (USA, UK and Australia), it is possible to declare that the first focus and reference relies on Program(me) Directors and Chairs and as a second choice, if we see that we don't have sufficient information to conduct the study, include also the Program(me) Coordinators and focus only on existing executive/non-administrative tasks that are present in the roles of Program(me) Directors/Chairs and Program Coordinators in Portugal as it's possible to note in the table below that cross refers the functions from table 1 with the main functions of appendix 3, having a global overview of the analysed countries:

Functions	PT	USA	UK	AUS
Ensure fulfilling of goals defined for the program, considering criteria for scientific and pedagogic effectiveness and efficacy	x	x	x	x
Represent the program at the institution's governing bodies	x		x	x
Contribute to adequate program operations, specifically by coordinating the courses syllabi and their academic activities	x	x	x	x
Propose the creation or cancellation of courses	x	x	x	x
Propose and comment on changes to the program's course listing	x	x	x	x
Draft proposals for staff hiring, and contract renewal or rescission	x	x		x
External promotion of the program and coordinate the organization of application processes	x	x	x	x
Draft an annual report, following models defined by the Scientific/Pedagogic Council of the institution	x	x		x
Perform lecturer performance assessment	x			
Develop communication channels with students, towards permanent information update and exchange of viewpoints	x		x	x
Assign vice-coordinators/chairs/directors to assist in the coordination roles	x			
Support students with special needs				x
Manage resources and manage new program admissions		x		
Manage budgets, costs, and supervise department(s) transactions		x		
Direct communication with Dean, Assistant Dean and internal and external stakeholders		x		x
Promote and manage objectives		x		
Coordinate and support in the development of the university library and its contents		x		

Table 5 – All program Coordinator functions distributed by country

Extracted all the functions for a program coordinator/chairing/directing role, it was selected for exclusion criteria purposes 9 different functions that are performed at least in 3 different countries as it is possible to observe on the table below where in green are the ones for all the countries and in yellow the ones that are referenced in 3 different countries.

Functions with at least 3 referenced countries
A - Ensure fulfilling of goals defined for the program, considering criteria for scientific and pedagogic effectiveness and efficacy
B - Contribute to adequate program operations, specifically by coordinating the courses syllabi and their academic activities
C - Propose the creation or cancellation of courses
D - Propose and comment on changes to the program's course listing
E - External promotion of the program and coordinate the organization of application processes
F - Represent the program at the institution's governing bodies
G - Draft proposals for staff hiring, and contract renewal or rescission
H - Draft an annual report, following models defined by the Scientific/Pedagogic Council of the institution
I - Develop communication channels with students, towards permanent information update and exchange of viewpoints

Table 6 - Selected functions to be used on extraction criteria of SLR

Chapter 5 – Performing the SLR

Under this section, a Systematic Literature Review takes place with emphasis on the three main phases, planning, conducting and result extraction to debate what were the findings and relate to the research questions.

5.1 Planning

Planning refers to the first approach of a SLR where using the motivation and the objectives mentioned above on section 1.2 and 1.3, respectively, it is proposed the initial investigation to support the research questions to be answered and determine the research protocol to follow [20].

Research Questions

This research has the main goal of finding relevant indicators to support the coordination of academic programs in the context of e-learning. In this way, were identified 2 key research questions ("What are the indicators known to support the academic program coordination?" and "Are those indicators relevant to the e-learning context?" – table 1) to be answered in this study that withstands the main research question that is "What indicators are relevant to support the coordination of higher education program in the context of e-learning?" as it is observed on table 1 of section 1.3.

Research Protocol

To start the literature review, is necessary to adopt a range of rules or a set of follow-up lines with the objective of having a reference scheme where it enables the actual status during the review [20], [22]. To that extent, the research protocol starts to determine the text or reference wordings to be searched that are going to be used on the search engines and libraries with in order to obtain the biggest number of results of studies that might contribute to help and support the proposed research questions in this study.

To this study we relied on the software "Harzing's Publish or Perish" to search Google Scholar libraries since it is a reliable and scholarly material only library with a very good coverage of English and non-English sources, as well as Open Access studies held in institutional repositories with the ability to view of how many times a specific article has been cited by others [23]–[26].

That said, it was used the wordings and the different context extracted from the previous section, derived from the analysis between different roles and functions across Portugal, USA, UK and AUS. To find this, it has been mapped 3 major scopes, "higher education" to match and funnels in what context we want our findings, it is acting as a "where". As a 2nd scope we have "Program Coordination" that relates to the coordination of the different programs among academic institutions and the 3rd scope relies on "Analytics and Measures" that leads to indicators that we want to extract. Mixing these 3 scopes with synonyms

and different ways of writing it (like "Program" or "Programme"), it was expected to result the max amount of information/studies possible (table 7) so it was used the strings "("higher education" OR "academic program" OR "academic programs" OR "university" OR "college" OR "faculty") AND ("course management" OR "program coordination" OR "program chair" OR "program chairing" OR "program coordinator" OR "program director" OR "program direction" OR "program coordinating") AND ("analytics" OR "indicators" OR "metrics" OR "dashboard" OR "dashboards" OR "instruments" OR "measures" OR "kpi" OR "analysis")" and "("higher education" OR "academic programme" OR "academic programmes" OR "university" OR "college" OR "faculty") AND ("course management" OR "programme coordination" OR "programme chair" OR "programme chairing" OR "programme coordinator" OR "programme director" OR "programme direction" OR "programme coordinating") AND ("analytics" OR "indicators" OR "metrics" OR "dashboard" OR "dashboards" OR "instruments" OR "measures" OR "kpi" OR "analysis")" on the search engine software to search on Google Scholar library by title.

Scope	Words to search
Higher Education	"higher education" OR "academic program" OR "academic programs" OR "university" OR "college" OR "faculty" OR "academic programme" OR "academic programmes"
Program/Course Coordination	"course management" OR "program coordination" OR "program chair" OR "program chairing" OR "program coordinator" OR "program director" OR "program direction" OR "program coordinating" OR "programme coordination" OR "programme chair" OR "programme chairing" OR "programme coordinator" OR "programme director" OR "programme direction" OR "programme coordinating"
Analytics & Measures	"analytics" OR "indicators" OR "metrics" OR "dashboard" OR "dashboards" OR "instruments" OR "measures" OR "kpi" OR "analysis"

Table 7 - Scopes and search strings

After querying and having initial results, it is necessary to apply the inclusion and exclusion criteria in order to reduce the sample of articles found in the library to only keep relevant ones and start narrowing the pipeline of studies to evaluate, in this first interaction of this study, it has been interpreted the following criteria:

Inclusion	Exclusion
- Only articles/Studies from last 5 years - Documents related to higher education, program coordination and indicators/KPI's inside the scope of the outputs of section 4 related to the role functions/tasks by title	- Not being from the last 5 years - Not in English, Portuguese or Spanish - Not related to one of the topics of the search word cloud from table 7 - Not accessible online - No duplicates

Table 8 - Inclusion and exclusion criteria

After this global selection of scientific studies, it is necessary, in a first phase, read the articles by the abstract and select the ones that can be relevant for this study.

Lastly, those articles are going to be evaluated and read with the purpose of focusing only the final studies more relevant for this systematic literature review to extract answers from them. It is possible to review this protocol on the diagram below:

Figure 2 - Revision Protocol

5.2 Conducting

As expressed on the section 3, this represents the 2nd phase of this systematic literature review initiating the review with the keywords and strings on the referred databases and libraries above, in this case, Google Scholar revised on the review protocol from the last section with the intent of analysing the extracted data.

Study selection

After applying the search criteria on the referred libraries of the revision protocol, it is possible to observe on the figure 3 that we found 465 scientific documents in total for American English strings and 282 documents for British English strings (stated on table 3 of section 4). After applying the filter for the last 5 years it has kept only 123 documents for American English and 39 for British English that led to a 162 scientific documents in total, after removing duplicate 122 documents were left to be analysed and after checking it by title and applying the inclusion and exclusion criteria, 40 were selected and after doing the same for the abstract, only 29 remained to be evaluated for further analysis of this study.
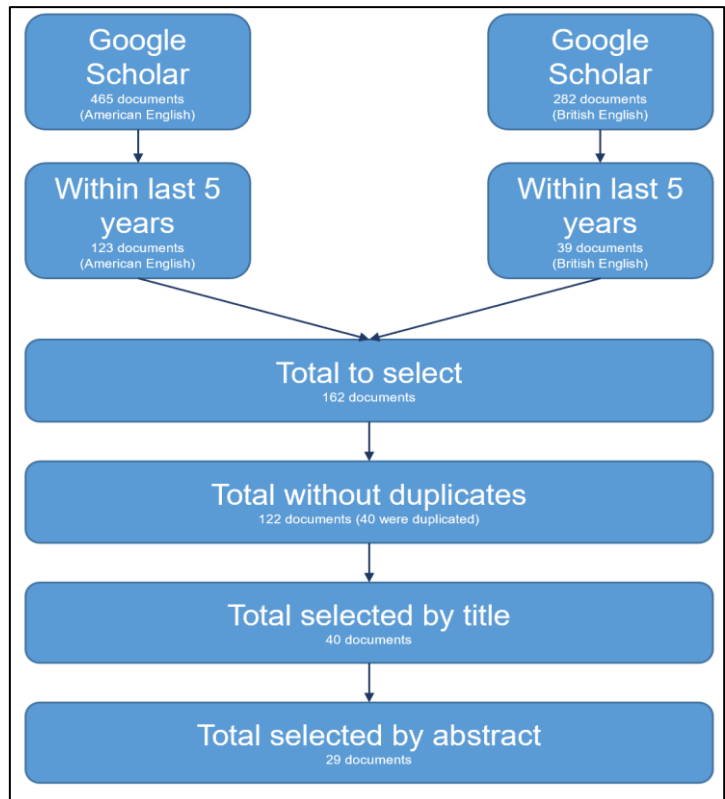
Figure 3 - Study selection process

As is possible to observe on the image above, an initial approach takes place with different parameters to narrow the pipeline of documents and enables the analysis of specific scientific documents that are relevant to this study with different properties like its type of document and its distribution.

It is important to note that the search by American English expression had much more findings than British English strings with a difference of 183 documents in total and even after the filter of the last 5 years, that difference reflects even more with 123 for AE and only 39 for BE leading to a 3 times more findings in terms of scientific documents. Also, as it is possible to note, from the final selection list (29 documents), 21 are journal articles and articles, thesis and dissertations are 4, then we have 3 conference proceedings articles and 1 book.
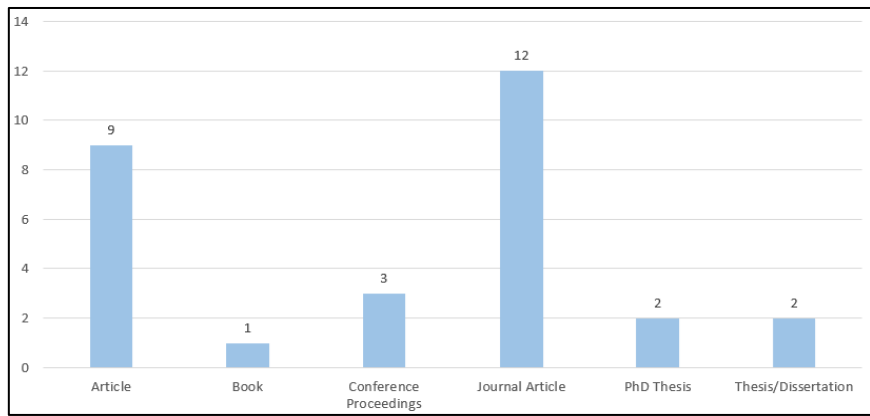
Figure 4 - Document distribution by typology

Thus, in percentage and grouping in categories of articles, thesis and other, we can verify on figure 5 that the articles are impacting the sample in quantity.
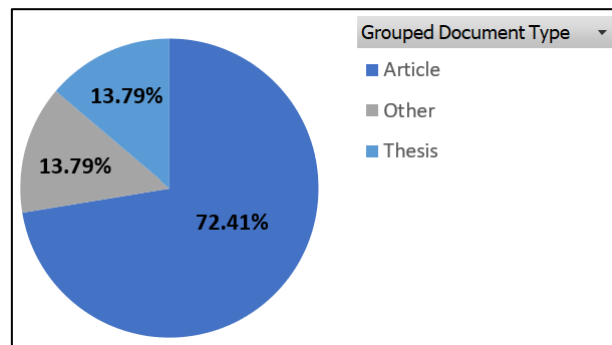
Figure 5 - Percentage distribution of grouped document types

Outcome of search

The final list of scientific documents resulted on the study selection can be observed on table 8 where it shows the document index, authors and title.

Index	Authors	Title
1	P Swuste, S Sillem	The quality of the post academic course 'management of safety, health and environment (MoSHE) of Delft University of Technology[27]
2	H Daka	Perspectives on course management, teaching and assessment of undergraduate programmes at the medical school of the university of Zambia[28]
3	B Teclehaimanot, J Peters	Factors that Influence Community College Instructors' Adoption of Course Management Systems [29]
4	PK Jarphan, S Saengchot, N Sridee, ...	Model of the Online Course Management of Mahachulalongkornrajavidyalaya University (MCU-OCMS) in the Era of Thailand 4.0 [30]
5	L Li	Study on the Application of Network Teaching Platform to the Teaching of Course Management Science-Xi'an International University Is Taken for Example [31]
6	RM Sapungan, M Jennifer	Dela Torre and Carla M Buitre. 2018. Course Management System (CMS) Utilization and Effectiveness for Teaching: Higher Education Teachers 'Perspective [32]
7	HD Vertucio, SL Gabriel, EL Malabanan	Development of Personality and Coaching Style Plan Through Conditional Approach of selected Deans and Program Chair of Arellano University-Malabon [33]
8	P Silpaksa	The development of learning management system (LMS) for GES1102 course management, science and quality of life, general education course, Suan Sunandha Rajabhat University [34]
9	M Daumiller, R Stupnisky, S Janke	Motivation of higher education faculty: Theoretical approaches, empirical evidence, and future directions [35]

10	LIU Bo-Wen, Y Li-Zhen	Exploration and Practice for the Management of University Chemistry Course [36]
11	R Triarisanti, P Purnawarman	The influence of interest and motivation on college students' language and art appreciation learning outcomes [37]
12	LFS Garcia, SS Amat, NM Garcia, ...	Schoology as an alternative to traditional teaching tools for university students [38]
13	JG Nair	Mediating role of personal accomplishment among emotional labour strategies and teaching satisfaction among professional college teachers [39]
14	M Vonk, NT Bent, H Bel	The Video supported collaborative learning knowledge alliance Erasmus+ (EU)-project [40]
15	N Snytnikova	Using a Learning Management System in the Course of English for University Students [41]
16	J Ofosu-Appiah	The Use of ICT in Teaching and Learning at the Wisconsin International University College [42]
17	AY Khawaji, MT Tessema, MS Nordin	The relationship between courses availability, student experience and college management which affecting student satisfaction with major curriculum: The Evidence from nine years of data. International Journal of Humanities and Social Science [43]
18	RF Sari, MR Luddin	Performance evaluation of academic services in the university using the balanced scorecard (Study at Indonesia Open University) [44]
19	B Yowe	Faculty perceptions of the online course review process: Does it improve quality? [45]
20	W Lin	Human Resources Management of Track and Field Web Course in College Physical Education [46]
21	HK Naphtali	The Role the Consortium of Uganda University Libraries (CUUL) can play in the Implementation of Successful Institutional Repositories in its Member Institutions in the Central Region of Uganda [47]
22	KM Kimmel, JL Fairchild, J Strada	Basic Course Leadership: Operational Transparency as a Best Practice for Adjunct Faculty Management [48]
23	CP Arabie	Educational technology tools in learning management systems influence on online student course satisfaction in higher education [49]
24	DD Tewari, KD Ilesanmi	Teaching and learning interaction in South Africa's higher education: Some weak links [50]
25	JG Durán, JJM Guardado, MAM Mata, ...	Mejora de Procesos para la Administración de Proyectos en Instituciones de nivel Superior-Process Improvement for Project Management in Higher Education Institutions [51]
26	W Lin	Research on Teaching Materials Management of Track and Field Web Course in College of Physical Education [52]
27	H Elrehail, OL Emeagwali, A Alsaad, ...	The impact of transformational and authentic leadership on innovation in higher education: the contingent role of knowledge sharing [53]
28	C Mesquita, RP Lopes, K Bredis	Entrepreneurship in higher education as a horizontal competence [54]
29	K Gupta, M Maksy	Factors Associated with Student Performance in an Undergraduate Financial Management Course: An Empirical Study at a US Public Residential University [55]

Table 9 - Dataset of papers resulting from the search process

Chapter 6 – Results and Discussion

6.1   Communicating results

Reporting or communication of result is the last step of this systematic literature review [20]. All analyses are based on the role of program coordinator discussed on section 4 that specifies the list of global functions that takes to do this role. To clarify, the most important task/function as a program coordinator is to ensure the well-functioning of the program during the whole academic year, the students' success and the support of their performances [18].

Data procedures

Before having final results, information across the entire selected list needed to be analysed and evaluated, to do so, a cross-checking needed to be done between the functions of a program coordinator and the information of extracted documents. To do this "We followed the process prescribed by Vaismoradi et al. [Vaismoradi, Jones, Turumen and Snelgrove 2016], who recommended use of qualitative, thematic techniques to collect and analyze data to yield meaningful, credible, and practical results." [56].

From the selected documents, specific indicators were extracted by comparing all the content related to course/program chairing/directing or coordinating functions analysed before on section 4 that appeared at least in 3 countries simultaneously as it is exposed on table 5 and it is summarized on the table below:

Extraction Criteria	Functions extracted from section 4
Within the functions that appeared at least in 3 countries simultaneously, it is going to be extracted all the related content to course chairing/directing or coordinating functions analysed on section 4 for PT, USA, UK and AUS	A - Ensure fulfilling of goals defined for the program, considering criteria for scientific and pedagogic effectiveness and efficacy.
	B - Contribute to adequate program operations, specifically by coordinating the courses syllabi and their academic activities.
	C - Propose the creation or cancellation of courses.
	D - Propose and comment on changes to the program's course listing.
	E - External promotion of the program and coordinate the organization of application processes.
	F - Represent the program at the institution's governing bodies.
	G - Draft proposals for staff hiring, and contract renewal or rescission.
	H - Draft an annual report, following models defined by the Scientific/Pedagogic Council of the institution.
	I - Develop communication channels with students, towards permanent information update and exchange of viewpoints.

Table 10 - Data extraction criteria from selected documents

After applying this process, it was possible to extract 46 raw indicators by reviewing the documents'
contents. Table 10 shows a summarization of the main sentences extracted and their raw indicators:

Article Index	Extraction Index	Extraction Sentences	Raw Indicator Extracted
1	1.1.	"A central coordinator with an **overview of the course content**, and close contact with course members was and is a crucial element of the course organization. The same argument goes for the course management, where a natural affinity in expertise is required to exercise sufficient control over selection of module leaders, and content of modules."	Overview of the course content
1	1.2	"A central coordinator with an overview of the course content, and close contact with course members was and is a crucial element of the course organization. The same argument goes for the course management, where a natural affinity in expertise is required to exercise **sufficient control over selection of module leaders**, and content of modules."	Module Leaders
1	1.3	"A central coordinator with an overview of the course content, and close contact with course members was and is a crucial element of the course organization. The same argument goes for the course management, where a natural affinity in expertise is required to **exercise sufficient control over** selection of module leaders, and **content of modules**."	Content of Modules
2	2.1	"Some course lecturers were said to be organised and their teaching contributed positively to performance of students. For example, in General Pharmacology (PGY 3220), it was cited by the respondents that the course was well managed because **lecturers are on time for lectures** and there is proper coordination of the whole course"	Timelines of lectures
2	2.2	"… the respondents that the course was well managed because lecturers are on time for lectures and **there is proper coordination of the whole course**"	Course coordination by the lectures
2	2.3	"The study further revealed that with an increase in the new programmes, the **lecturers were overloaded** and had little or no time to avail themselves to students and even private time for research." & "The study further revealed that with an increase in the new programmes, the lecturers were overloaded and had little or no time to avail themselves to students and even private time for research."	Lecturers' workload
2	2.4	" It is assumed from this study's conceptual framework that if teaching and learning is managed well then **students' GPA** can be raised and the examination attrition rates can also be reduced. These two outcome indicators can guide as to whether there is quality teaching and learning."	Student's GPA (Grade Point Average)
2	2.5	" It is assumed from this study's conceptual framework that if teaching and learning is managed well then students' GPA can be raised and the **examination attrition rates** can also be reduced. These two outcome indicators can guide as to whether there is quality teaching and learning."	Student's examination attrition rate
2	2.6	" **Student achievement results are important indicators of educational quality**"	Student achievements results
5	5.1	"With the openness of the campus network teaching platform, the resources for teachers to prepare lessons are greatly enriched, and young teachers become very convenient to collect the resources and prepares a lesson" & "Most teachers	Learning materials leverage

		aim to download the related Management Science teaching videos and browse the excellent course construction of other schools from the teaching resources platform. In other words, they take advantage of the network resources only for improving the personal teaching quality and have no more progresses. "	resources platform
5	5.2	"With the openness of the campus network teaching platform, the resources for teachers to prepare lessons are greatly enriched, and young teachers become very convenient to collect the resources and prepares a lesson" & "Most teachers aim to download the related Management Science teaching videos and browse the excellent course construction of other schools from the teaching resources platform. In other words, they take advantage of the network resources only for improving the personal teaching quality and have no more progresses. "	Course construction leverages resources platform
7	7.1	"The following were identified by both Faculty and Academic Heads as indicators for effective coaching: **building the relationship**, strong collaboration, providing assessment, support and encouraging, and school culture are factors to consider as the most areas to focus in improving the coaching process."	Coaching relationship development
7	7.2	"The following were identified by both Faculty and Academic Heads as indicators for effective coaching: building the relationship, **strong collaboration**, providing assessment, support and encouraging, and school culture are factors to consider as the most areas to focus in improving the coaching process."	Coaching collaboration strength
7	7.3	"The following were identified by both Faculty and Academic Heads as indicators for effective coaching: building the relationship, strong collaboration, providing assessment, **support and encouraging**, and school culture are factors to consider as the most areas to focus in improving the coaching process."	Coaching delivery of support & encouragement
7	7.4	"The following were identified by both Faculty and Academic Heads as indicators for effective coaching: building the relationship, strong collaboration, **providing assessment**, support and encouraging, and school culture are factors to consider as the most areas to focus in improving the coaching process."	Coaching assessment delivery
7	7.5	"The administration through the initiative of the Deans and Program Chair shall encourage the teachers in enrolling with the different fields of **Continuing Professional Development (CPD) or post graduate levels.**"	Teachers' enrollment on Continuing Professional Development or post-graduate levels
11	11.1	"Therefore, **teachers or lecturers should be able to arouse the interest of learners**. Teachers should be able to make learners happy in learning. **With the interest that arises, learners will try better with the lessons, and hopefully learners will get good learning outcomes**."	Students interest
11	11.2	"Therefore, teachers or lecturers should be able to arouse the interest of learners. **Teachers should be able to make learners happy in learning**.	Students Happiness
15	15.1	"Both the students and the teachers find that the LMS is effective as a means to increase the **outcome of studying a traditional course**"	Study outcome of the course

15	15.2	"The course structure is transparent to the students, so it helps them **manage their time** and maintain their self-motivation"	Student time allocation
15	15.3	"The course structure is transparent to the students, so it helps them manage their time and **maintain their self-motivation**"	Student self-motivation
15	15.4	"The **teacher facilitates** learning by providing the learning materials as well as **supervisory** and organizational help. "	Teacher provision of supervisory help
15	15.5	"The **teacher facilitates** learning by providing the **learning materials** as well as supervisory and organizational help. "	Learning materials facilitation
15	15.6	"The teacher facilitates learning by providing the learning materials as well as supervisory and **organizational help**. "	Teacher provision of organizational help
16	16.1	"LMS will help the lecturers to provide their learning materials and also **interactivity features such as thread discussions, shared files and forums**. This will provide proper training and **guidance for students and lecturers** using the LMS, as well as have a team which is on-call at all times to solve any problems that may arise"	Student guidance via LMS materials and activities
16	16.2	"**LMS will help the lecturers** to provide their learning materials and also interactivity features such as thread discussions, shared files and forums. This will provide proper training and guidance for students and lecturers using the LMS, as well as **have a team which is on-call at all times to solve any problems that may arise**"	LMS helpdesk availability
17	17.1	"To develop any institution should have deferent kind of evaluation , **one of the measurement evaluation is satisfaction model** for evaluate among curriculum to be improved and this measurement should be nationality for all high institutions."	Curriculum satisfaction
20	20.1	"**Teacher-student forum module** evaluation system managreement can effectively evaluate the **performance of students** and classes"	Student performance
20	20.2	"**Teacher-student forum module** evaluation system managreement can effectively evaluate the **performance of** students and **classes**"	Class performance
22	22.1	"utilizing **transparent management practices** with adjuncts can effectively contribute to adjunct engagement, and transitively, potentially enhance **student learning outcomes**"	Student Learning Outcome
23	23.1	"LMS collaboration tools include activities such as forums and group projects. Additionally, peer assessment activities are a way to foster collaboration and **encourage students to discuss and cooperate with their peers** (Martín-Blas & Serrano-Fernández, 2009)"	Students' cooperation
23	23.2	"higher education instructors can create a seamless experience for the students. Parker, Bianchi, and Cheah (2008) as well as Yohon, Zimmerman, and Keeler (2004) found that LMS users positively rated LMS features that facilitated course management. " & "effectively manage aspects of their courses such as **tracking student participation** and performance"	Student participation
23	23.3	"higher education instructors can create a seamless experience for the students. Parker, Bianchi, and Cheah (2008) as well as Yohon, Zimmerman, and Keeler (2004) found that LMS users positively rated LMS features that facilitated course management. " &	Student Performance

		"effectively manage aspects of their courses such as **tracking student** participation and **performance**"	
23	23.4	"effectively design and manage the online learning environment, higher education online instructors can better **engage their students** and promote positive course satisfaction"	Student engagement
23	23.5	"effectively design and manage the online learning environment, higher education online instructors can better engage their students and promote positive **course satisfaction**"	Student course satisfaction
23	23.6	"Researchers have found that student satisfaction is related to **retention,** quality, and student success (Noel-Levitz, 2011; Yukselturk & Yildirim, 2008). "With the rapid growth and higher attrition rates in online education, higher education administrators are placing great emphasis on **student retention**"	Student retention
23	23.7	"Researchers have found that student satisfaction is related to retention, **quality**, and student success (Noel-Levitz, 2011; Yukselturk & Yildirim, 2008).	Quality of instruction
23	23.8	"Researchers have found that student satisfaction is related to retention, quality, and **student success** (Noel-Levitz, 2011; Yukselturk & Yildirim, 2008).	Student success
24	24.1	"One of the major factors that influence **students' performance** includes **qualification of teachers"** & **" the quality of an education system** cannot exceed the quality of its teachers. The **quality of teachers/lecturers is a major factor that shapes the learning and growth of students**" & "there is a need for quality teachers as they make a difference in learner achievement and improved **graduation rate**"	Graduation rate
24	24.2	"One of the major factors that influence **students' performance** includes qualification of teachers" & " the quality of an education system cannot exceed the quality of its teachers. The quality of teachers/lecturers is a major factor that shapes the learning and growth of students" & "there is a need for quality teachers as they make a difference in **learner achievement** and improved graduation rate"	Learner achievement
24	24.3	"**student success depends to a large extent on the quality of input**. For example, a unit increase in academic staff with a minimum qualification of PhD will lead to an **increase in the students' success rate** by 0.4% ditto education expenditure."	Students' success rate
24	24.4	"Other performance measurement techniques should be employed to identify **students within the lower performance group with high hidden potential** due to lack of quality schooling and enabling environment for optimal performance"	Students' potential
29	29.1	"**motivation** and effort**, among other factors, significantly influence students' performance in college**." & " students' motivation as measured by their intention to make higher grade is a significant predictor of higher grade" & "we can conclude that there is **positive association** between **motivation** and effort variables. This positive association is necessary if higher motivation is to **lead to better performance**."	Student motivation

| 29 | 29.2 | "motivation and **effort**, among other factors, **significantly influence students' performance in college**." & " students' motivation as measured by their intention to make higher grade is a significant predictor of higher grade" & "we can conclude that there is **positive association** between motivation and **effort variables**. This positive association is necessary if higher motivation is to lead to better performance." | Student effort |
| 29 | 29.3 | "we suggest that **faculty motivate students to do homework and attend classes and put sufficient time in their studies**. They need to emphasize to their students that if they are motivated to earn higher grades in the UFM course they must do **homework, attend classes, and put in sufficient study time**" | Student engagement in class activities |

Table 11 - Extraction of raw indicators to support the coordination of academic programs

As an auxiliary method during this process of extraction, all raw indicators were mapped to their matching coordination role, creating a matrix of the extraction of raw indicators to support the coordination of academic programs (table 10), associating them with the data extraction criteria from selected documents (table 9) as shown below:

| | | Functions Index | | | | | | | | | Indicators |
		A	B	C	D	E	F	G	H	I	
Indicators Index	1.1		x		x						Overview of the course content
	1.2		x								Module leaders
	1.3		x		x						Content of modules
	2.1	x	x						x		Timeliness of lectures
	2.2	x	x								Course coordination by the lecturers
	2.3	x	x					x			Lecturers' workload
	2.4	x	x						x		Student's GPA
	2.5	x							x		Student's examination attrition rate
	2.6	x	x						x		Student achievement results
	5.1	x	x								Learning materials leverage resources platform
	5.2	x	x								Course construction leverages resources platform
	7.1		x							x	Coaching relationship development
	7.2		x							x	Coaching collaboration strength
	7.3		x								Coaching assessment delivery
	7.4		x								Coaching delivery of support & encouragement
	7.5	x						x			Teachers' enrolment on Continuing Professional Development or post-graduate levels
	11.1		x								Students Interest
	11.2		x								Students Happiness
	15.1	x	x						x		Study outcome of the course

	A	B	C	D	E	F	G	H	I	
15.2	x	x	x					x		Student time allocation
15.3	x	x								Student self-motivation
15.4	x	x								Learning materials facilitation
15.5	x	x								Teacher provision of supervisory help
15.6		x								Teacher provision of organizational help
16.1	x	x								Student guidance via LMS materials and activities
16.2		x								LMS helpdesk availability
17.1		x						x		Curriculum satisfaction
20.1	x	x						x		Student performance
20.2	x	x						x		Class performance
22.1	x							x		Student Learning Outcome
23.1		x								Students' cooperation
23.2	x	x						x		Student Participation
23.3	x	x						x		Student Performance
23.4	x	x								Student engagement
23.5	x	x						x		Student course satisfaction
23.6	x							x		Student Retention
23.7	x	x					x			Quality of instruction
23.8	x							x		Student success
24.1	x							x		Graduation Rate
24.2	x									Learner achievement
24.3	x							x		Student success Rate
24.4	x									Students Potential
29.1	x									Student motivation
29.2	x									Student effort
29.3	x	x								Student engagement
Total	32	34	1	2	0	0	3	17	2	

Table 12 - Functions VS raw Indicators matrix

As it is possible to note, roles A and B (table 9) are the ones where it is possible to find more related information or citations about a program coordinator indicator and in 3rd is role H related to the annual model reports to be defined by the scientific-pedagogical council, on the other hand but not less important is the role C, D, G and I than had less than 4 references in the entire dataset where role E and F didn't have any indicator collected as it's possible to note by figure 6.
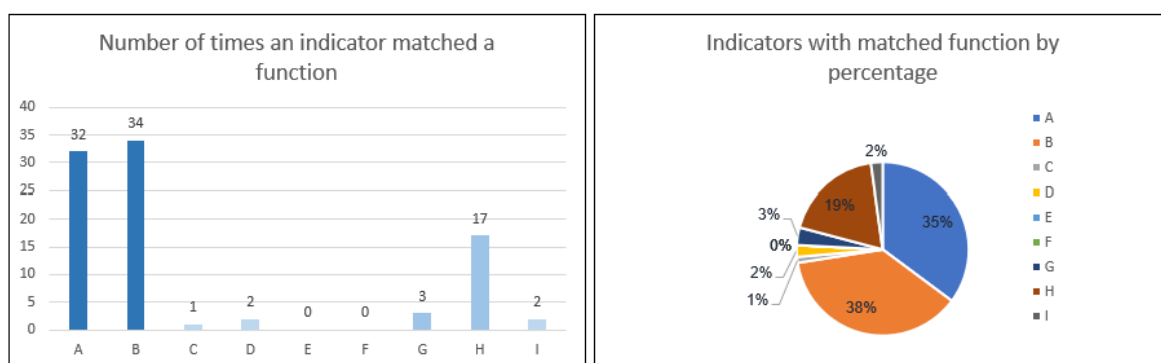
Figure 6 - Program Coordination indicators distribution by its functions

Results - What are the indicators known to support the academic program coordination?

After having the list of indicators and to support answering the research question, is necessary to define themes regarding its properties of "serving as a main product of data analysis that yields practical results in the field of study" [57] and it's used as a descriptor or as an attribute to explain a specific concept. Each indicator has been analyzed and interpreted in an abstract and implicit level deriving from intellectual and effective content [57].

To initialize the theme development, a continuous process was made regarding reading the transcriptions from all the raw indicators specified on section 4 and section 5 where it has been possible to highlight the meaning units where the raw indicators from the previous section were extracted. Also, as it is possible to observe on table 11, a coding process was made to organize the available data and reduce to simple concepts [57]. With this, a comparison level approach was possible to relate with similar or different extracted concepts resulting in provisory themes which were compared by name and definition to check if there was an overlapping, a merge possibility or even a separation process. With this iterative process, it is possible to achieve more and more abstract or concrete level of analysis for qualitative content depending on what is the necessity or goal at that point of the study.

Table 13 shows that from 46 raw indicators extracted from previous procedure, 26 different themes emerged from reading and immersion and it can be shown more in-depth on appendix 4 [[56], [57].

Theme nº	Themes
1	Program and Course Contents
2	Sufficient Control Over Selection of Module Leaders
3	Teaching Availability
4	Course Coordination
5	Student Outcome Level
6	Student Attrition Rate
7	Student Achievements

8	Quality of Teaching Materials
9	Program and Course Coaching
10	Lecturers Enrolment on Professional Development
11	Students Interest
12	Student Satisfaction
13	Student Outcomes
14	Student Time
15	Student Motivation
16	Learning Materials
17	Providing Teaching Support
18	LMS Availability
19	Student Development Level
20	Class Achievements & Performance
21	Student Collaboration
22	Student Engagement
23	Student Retention
24	Student Quality
25	Students Potential
26	Student Effort

Table 13 - Program coordination themes
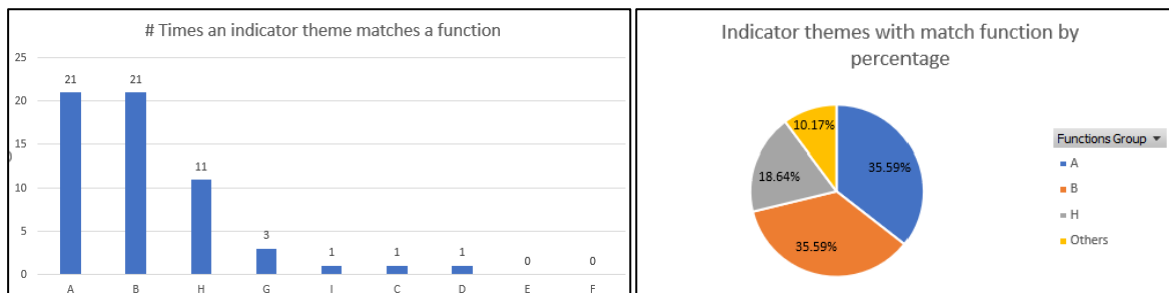
Figure 7 - Program Coordination indicator themes distribution by its functions

Extraction Index	A	B	C	D	E	F	G	H	I	Indicator Themes
1.1; 1.3		x		x						Program and Course Contents
1.2;		x								Sufficient Control Over Selection of Module Leaders
2.1; 2.3	x	x					x	x		Teaching Availability
2.2;	x	x								Course Coordination
2.4; 24.1; 24.3;	x	x						x		Student Outcome Level
2.5;	x							x		Student Attrition Rate
2.6; 22.1; 23.3; 24.2;	x	x						x		Student Achievements
5.1; 5.2;	x	x								Quality of teaching materials
7.1; 7.2; 7.3; 7.4		x							x	Program and Course Coaching
7.5;	x						x			Lecturers enrolment on Professional development
11.1;		x								Students Interest
11.2; 17.1; 23.5;	x	x						x		Student Satisfaction
15.1; 16.1;	x	x						x		Student outcomes
15.2;	x	x	x					x		Student Time
15.3; 29.1;	x	x								Student Motivation
15.4;	x	x								Learning Materials
15.5; 15.6;	x	x								Providing teaching support
16.2;		x								LMS Availability
20.1; 23.8;	x	x						x		Student development level
20.2;	x	x						x		Class Achievements & Performance
23.1; 23.2;	x	x						x		Student Collaboration
23.4; 29.3;	x	x								Student Engagement
23.6;	x							x		Student Retention
23.7;	x	x					x			Student Attributes
24.4;	x									Prospective Student Level
29.2;	x									Student Effort

Table 14 - Functions VS Indicator themes matrix

Student Outcome Level - Indicators that provide a level of the outcome of students in courses, typically a grade point average or similar.

Program and Course Contents - Indicators to assess the level of information provided through the program and the courses with resources on software that is used as a web library for student access. It can be a Moodle platform with all the content related to the program and courses.

Learning materials - Indicators used to demonstrate the maturity level of tools used to share program and course information.

Sufficient Control Over Selection of Module Leaders - Indicators that demonstrate the chair's ability to choose and select module leaders for a specific program.

Teaching Availability - Indicators that allow to determine how ready a teacher is to engage any concern during an academic program.

Quality of teaching materials - Indicators that provide the quality of teaching materials during an academic program or course.

Teachers enrolment on professional development - Indicators to assess the professional improvement for teachers during a program or course.

Provisioning help on teaching - Indicators to define the level of continuous provision to encourage the students to learn in the absence of a teacher during a program or course.

Course Coordination - Assess the level of course coordination by the lecturers.

Student Attrition Rate - Indicators used to measure student's leaving the academic education system in the first year. It can be analysed for a specific course or program, individual or group.

Student Achievements - Indicators that measure the amount of academic content a student learns in a given course or program.

Student Development Level - Indicators that assess the ability to execute its work independently. It involves factors such as the intellectual level, personality, motivation, skills, interests, study habits, self-esteem or the teacher-student relationship.

Program and Course Coaching - Indicators used to assess the amount of assistance and collaboration between lecturers and students among programs and courses.

Student Outcomes - Indicators that state the level of knowledge, skills and abilities an individual student should possess and can demonstrate upon completion of proposed statements and goals during an academic program or course.

Student Collaboration - Indicators that provide the ability to quantity the level of shared ideas and thoughts alongside academic stakeholders to achieve a shared objective.

Students Interest - Inclination of the student towards a particular subject, course or program.

Student Satisfaction - Indicators that relate to the wellbeing of the student during the academic program or course.

Student Time - Time spent by the student with the academic program.

Student Motivation - Indicators where the student is focused and well determined to achieve the academic goals.

LMS Availability - Indicators to support and ensure that a technical tool/software that lecturers encounters is brought into solution in a matter of time.

Class Achievements & Performance - Indicators related to the favourable results of a class as a whole and how they achieved that common goal.

Student Engagement - Indicators referring to non-observable behaviours that quantify the amount of work done that can support the assessment of other measures like the level of focus, availability and willingness that students show when they are learning or being taught.

Student Retention - Indicators that provide the level of academic completion and all who enrolled or registered on a program/course (including any who have withdrawn or cancelled).

Student Attributes - Indicators that quantify the number of traits a specific student has, allowing to assess if the student cooperates, helps and overcomes all the challenges trough the academic program showing its strengths, performance and skills.

Prospective Student Level - Indicators that show the student strengths and core abilities that allows to be highly considered in the future to enrol a specific academic program or course.

Student Effort - Indicators that refer to observable behaviours during the academic year whether a student tries hard, asks for help, and/or participates in the program.

Results - Are those indicators relevant to the e-learning context?

There's no single definition regarding e-learning, but rather various definitions of the concept. A few creators restrict e-learning to classes that take put completely online, whereas others consider all learning that utilizes information and communication innovations as being a frame of e-learning, as such, a Professor that produces accessible contents on the Web would be considered within the e-learning environment, in some cases is called b-learning (blended learning) [58].

In this thesis, the e-learning concept relies on every single way of teaching and learning outside the border of the physical learning (or classroom teaching), not only focusing on tools, but also on different ways to communicate, different approaches to educational processes and also the opportunity to leverage educational institutes by giving the opportunity for abroad students to enrol in a different set of programs without the need of being there physically [59]. This is possible to achieve with the help of information technology and new ways of thinking in which software and platforms are being used to leverage this type of learning and also enables analytical properties to be able to extract useful information about the academic programmes [60].

Most of the themes expressed above are around the student and program itself, that's also why most matches (more than 70%) are related to role A and B on figure 6. Others like communication inside the course and program or even more administrative related roles are less expressed in this review but doesn't mean that are less important [61], [62].

This said, and since this study relies on program coordination roles extracted from official statutes from universities that have e-learning component [1]–[14], [17]–[19], [59], [63]–[67] and, one of those that is important to mention (Universidade Aberta) by its core functionality on e-learning and distance learning programs/courses and it references 7 of the 9 roles (table 2), it can be said that all the themes extracted

above are relevant to the e-learning context because the evaluation and extraction criteria were meet based on those roles (table 11) to be able to produce this list (table 12).

Under results section and to support the answer of the first research question, a qualitative process was done to extract and get useful themes derived from raw indicators from the review dataset. By analyzing the results and to support the theming aggregation, it was made a categorization or grouped themes in clusters identified on table 15 (and can be observed more in depth on appendix 6) to be able to describe them easily and further enter in the abstraction process [57].

Category Code	Theme Categories
1	Syllabus and Contents
2	Program and Courses Management
3	Teaching Quality and Availability
4	Student Ratings
5	Program and Course Communication

Table 15 - Program Coordination Theme Categories

Syllabus and Contents - Indicators that summarizes topics which will be covered during an academic course or program and all the content provided by the academic board (program coordinator, chair or director and lecturers).

Student Achievements & Performance - Indicators that provide a level of the outcome of students in courses and measurements of the amount of academic content student learns.

Program and Course Communication - Indicators that assess the level of communication between students and lecturers that helps them better understand the course and program.

Teaching Quality and Availability - Indicators that are assigned to lectures and lecturers regarding time, resources and materials.

Program and Course Management - Indicates the level of control a program or course has, assess the status of it, how it is being supported and governed by the program coordinator and lecturers.

Student Ratings - Indicators associated to individual students to identify an overall level of appraisal or classification during an academic program or course.

6.2   Results Analysis

At the beginning of this study, a state of the art was carried to analyse and transcribe the role of the program coordinator (or chairing or directing) into actual functions or generic tasks (table 2).

Knowing the nomenclature and characteristics of a program coordinator was needed to assess on how to search for the role and extract information from universities like Portugal, UK, USA and AUS and merged that information to be able to have an overview of the functions to support the program coordination role. Done that, it was possible to achieve an initial list of functions (appendix 1 and 2) that relates its statute among all of those universities categorizing them in the 3 different levels for the role (Program Coordinator, Program Director and Program Chair).

Initially there were 23 directly extracted functions and without duplicates it ended up with a list of 17 functions (Appendix 7). To be more precise in terms of extraction process for the SLR, the main criteria to select and evaluate on the dataset was based on the functions with at least 3 references out of 4 countries (table 6) and it was able to extract 46 raw indicators that were mapped along with these functions selected (table 12). From the 46 raw indicators, it was possible to identify that Function A, B and C were the ones that matched the most with 32, 34 and 17 respectively, others were below 3 matches and there was no representation for function E and F that indicates that "External promotion of the program and coordinate the organization of application processes" and "Represent the program at the institution's governing bodies" is not mentioned in any indicator of this study. Also important to mention that function E is a role that is mentioned on all statutes in all countries that this study approaches. Overall, the function A and B have a representation among the total of 35% and 38% respectively that leads to a conclusion that 73% of all extracted raw indicators matched with these functions (figure 6).

When it comes to indicator themes, instead of 46 raw indicators, we had 26 indicator themes evaluated to match between function roles. This said, It is possible to verify on figure 7 that the same representation happens where we have 3 main groups with function A and B leading the way with 35,59% of matches each (71,18% both), next is function H with 18,64% and then merging all the other functions (C, D, G, I) are represented with 10,17%. Still, function E and F are not represented.

To conclude the results analysis by comparing the state of art with the systematic literature review, it is possible to share that indicator themes about the function A and B are fulfilled and well represented (more than 70%) and also themes related to function H is also represented in this study. Regarding others, needs to have more field research to have more information about these indicators among these functions, since in a total of 9 generic roles/functions to support the coordination of academic programs, only 3 are represented in this study with almost 90% of representation. So there's a big window to work among the literature and it is important to mention that function C, D and E are noted in statutes of the 4 countries so it states the importance of having information and indicators to fulfil this gap.

Chapter 7 – Limitations, conclusions and future work

7.1 Limitations

This study was developed with the scope of providing different indicators that can be useful to understand what is a program coordinator role in the academic area and also how can it be valuable to the e-learning context. But during this research, it has been found that little or almost no information is available regarding direct indicators and theoretical approach to what is a program coordinator.

Since there're no base research on what is the role itself, only legal statements or statutes and they differ university by university and location. It is important to mention that the role can change during time since it is a matter of changing its tasks or role and, as example, it can be introduced more administrative tasks, or even the LMS can evolve in a point that the role itself can be deprecated one day, that's why a theoretical background served to introduce the role and all the systematic review was related to those roles found.

Other limitation is that it was only analysed several institutions from Portugal, United States, Australia and United Kingdom so it would be relevant to have more information regarding more countries and more institutions to leverage the literature research and have a better panorama about the role and understand more about its functions regarding what are the ones that are recurrent and the ones that are circumstantial. Also in current LMS of academic institutions, it could be possible to extract indicators to support program coordination role that aren't explicit in published scientific papers, something that only a field surveying/research can clarify.

It is essential to say that it is not expected to identify in this report which indicators are more relevant to the role or what're the top priority for e-learning role analysis, it is only to mention what are the indicators in the referred, selected and extracted dataset and if they're relevant to the e-learning context.

7.2 Conclusions

This research allows to assess what data can be extracted regarding program coordinators and its indicators or KPI's. It is presented what is a program coordinator in three different countries based on legal documents that states their main roles or tasks.

With that, it was conducted a systematic literature review to extract, select and find useful information to draw conclusions on what are the indicators related to those roles, doing qualitative analysis on finding themes and clustering.

Focusing on the main objective of this thesis and answering the main research question "What indicators are relevant to support the coordination of higher education programs in the context of e-learning?", everything was addressed and comprised in this study that led to discover all the 26 indicator themes grouped by 5 different categories and all relevant to the context of e-learning since all the extraction criteria and result analysis was based on it since the theoretical background of this study and all the mappings between all the extractions and program coordination roles.

In this study, it is possible to conclude that among 26 indicator themes stated on section 6 extracted by an SLR including the state of the art extraction criteria by having a match on different roles to support the program coordination, only 3 out of the 9 main functions shown in this study are well represented with indicators that leads to a lack of information among scientific studies about this topic.

To conclude, it is possible to note that compliance of the objectives and contribute to the proper functioning of the program are the most represented indicators in this study with the main focus on the student, where we can say that 15 themes are related to student's and the other 11 themes identified are regarding the courses, contents and the academic programme itself.

7.3   Future work

There's still a lot to do in this field of e-learning, distance learning program coordination or e-learning analytics. They're all related to each other and there's not much information about it.

This study presented an initial process that can be leveraged with more studies around it, for example, directly in the case of indicators, find which ones are the most important ones, or even dig more about the indicator itself, how it can be extracted or how it can be presented to help in the coordination of academic programs. Also, there's a lack of information or indicators on functions stated on sections 5 and 6 of this study with the theme indicator representation of more than 50% about students, so there's a gap to fill about more administrative roles and coordination roles that aren't directly connected to students.

To do this, a field research can improve the level of knowledge in terms of learning information systems or even about gathering statutes in more and more academic institutions with the ability to survey different program coordinators to extract different tasks and functions of a daily basis that are not considered on this study statutes (since there are tasks/functions that aren't specified in the legal role statute).

Different approaches can be taken and this study can be a baseline to do it. More and more information is needed to get better and assertive conclusions about the whole topic of e-learning and e-learning analytics since in the future, more and more, is conducted to have this type of educational approach among universities, programs and courses.

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Appendix

Appendix 1 – Program Coordinator responsibilities in Portugal (direct extractions from estatutes)

Responsabilidades Coordenadores de Cursos	Universidade
a) Representar o curso junto dos órgãos da ESGTS e do IPS; b) Contribuir para o bom funcionamento do curso, nomeadamente pela coordenação dos programas das unidades curriculares e das actividades lectivas; c) Assegurar que os objectivos de aprendizagem das diversas unidades curriculares concorram para os objectivos de formação definidos para o curso; d) Organizar e dar parecer sobre propostas, gerais ou individuais, de creditação ou de substituição de unidades curriculares; e) Fazer propostas e dar parecer sobre alterações dos planos de estudos do curso; f) Elaborar um relatório anual de modelo a definir pelo conselho científico -pedagógico do IPS; g) Desenvolver todas as demais iniciativas e acções tendentes a assegurar o bom funcionamento e prestígio do curso, nomeadamente a sua promoção externa.	IP Santarém
1 - Todos os cursos da responsabilidade da FCTUC têm um Coordenador. 2 - O Coordenador do curso é eleito pelo Conselho Científico ouvidas as Comissões Científicas dos Departamentos envolvidos na lecionação desse curso. 3 - O mandato dos coordenadores caduca quando cessa o mandato do Conselho Científico que os elegeu, mantendo-se em funções até à eleição de um novo coordenador. 4 - O Coordenador tem por missão acompanhar o funcionamento do curso, em ligação com os Diretores dos Departamentos envolvidos na sua lecionação, e colaborar na aplicação do Sistema de Gestão da Qualidade da Universidade de Coimbra nos aspetos que se relacionem com esse funcionamento. 5 - No cumprimento da missão referida no número anterior, o Coordenador reúne com os professores do curso para efeitos de coordenação do seu funcionamento, datas de avaliação e volume de trabalho solicitado aos alunos, informando o Conselho Científico e as Comissões Científicas dos Departamentos envolvidos no curso sobre a sua atividade. 6 - O Coordenador pode escolher até dois Vice-coordenadores para o coadjuvarem. 7 - Os estudantes de cada curso elegem anualmente um representante que constitui o interlocutor principal do Coordenador do curso nas matérias relevantes para os estudantes. 8 - O Coordenador do curso, com o apoio dos representantes dos alunos, identifica e procura resolver os problemas de índole pedagógica associados ao seu funcionamento, recorrendo, quando tal se revele impraticável, ao Diretor do Departamento e, em última instância, ao Conselho Pedagógico.	FCTUC / U. Coimbra
a) Propor a criação ou extinção de unidades curriculares; b) Coordenar os programas e a aplicação de métodos de ensino relativos às unidades curriculares das suas áreas; c) Propor ao Presidente do DEG, a distribuição do serviço docente, de lecionação e vigilância, das unidades curriculares e dos docentes integrados das suas áreas. d) Avaliar o desempenho dos docentes integrados nas suas áreas; e) Elaborar as propostas de contratação de pessoal, de renovação e de rescisão de contratos.	IST/U. Lisboa
a) Assegurar o cumprimento dos objetivos definidos para o curso atendendo a critérios de eficácia e eficiência científica e pedagógica; b) Implementar medidas de avaliação das atividades desenvolvidas nomeadamente no que se refere à qualidade científica e pedagógica do serviço prestado; c) Propor as alterações consideradas necessárias, nomeadamente no plano de estudos, conteúdos das unidades curriculares, características da avaliação e métodos pedagógicos, em conformidade com os resultados da avaliação, que conduzam a uma melhoria da qualidade do ensino; d) Coordenar a organização dos processos de candidatura; e) Desenvolver canais de comunicação com os estudantes que permitam uma informação permanente e o debate de ideias, atendendo às especificidades do ensino a distância;	UAb

f) Reunir regularmente com os docentes responsáveis pelas unidades curriculares que compõem o curso para debater os assuntos que se encontram sob a sua responsabilidade; g) Zelar pela existência de condições humanas e logísticas para o bom funcionamento dos cursos.	
2 — O Diretor de Curso é escolhido conforme especificado nos Estatutos da Faculdade responsável pela sua designação. 3 — O Diretor de Curso pode ter direito a uma redução de serviço docente. 4 — A Comissão Científica é constituída pelo Diretor de Curso, que preside, e por dois a quatro professores ou investigadores doutorados, designados nos termos previstos no respetivo regulamento. 5 — A Comissão de Acompanhamento é constituída pelo Diretor de Curso, que preside, e por outros três membros, um docente e dois discentes do curso, a escolher nos termos do disposto no respetivo regulamento. 6 — Ao Diretor de Curso compete assegurar o normal funcionamento do curso e zelar pela sua qualidade, devendo as suas funções ser explicitadas nos Estatutos da Faculdade. 7 — À Comissão Científica compete: a) Promover a coordenação curricular; b) Pronunciar-se sobre propostas de organização ou alteração dos planos de estudo; c) Pronunciar-se sobre as necessidades de serviço docente; d) Pronunciar-se sobre propostas de regimes de ingresso e de numerus clausus; e) Elaborar e submeter às entidades competentes o regulamento do curso. 8 — Os diretores e comissões científicas de terceiros ciclos poderão ter competências específicas a fixar nos respetivos regulamentos. 9 — À Comissão de Acompanhamento compete zelar pelo normal funcionamento do curso. 10 — As Faculdades responsáveis pela lecionação de um número reduzido de cursos podem atribuir aos seus órgãos de gestão com funções afins as competências definidas para os órgãos de gestão dos cursos. 11 — Os cursos assegurados por parcerias internas ou externas à Universidade do Porto reger-se-ão por regulamentos próprios, com as necessárias adaptações, aprovados pelos órgãos competentes dos parceiros.	U. Porto

Appendix 2 – Program(me) Coordinators, Directors and Chair responsibilities by country (translated PT)

Funções (Traduzido)	Função "Program(me)…"	EUA	UK	AU
Gerir a revisão contínua de currículos, promover comercialmente e monitorizar requisitos dos programas, incluindo procedimentos para iniciar ou modificar programas académicos.	Coordinator	x	x	x
Focar na administração e assistência e à submissão atempada de requisitos e relatórios de apoio à gestão dos programas	Coordinator	x		x
As tarefas e funções dos Program Coordinator podem variar conforme o Assistente de Departamento ou Director de Departamento	Coordinator	x		
Gerir recursos e administrar novas admissões aos programas e organizar o calendário conforme o programa	Coordinator	x		x
Rever documentação e gestão documental e administrativa	Coordinator	x	x	x
Trabalhar em conjunto com o Assist. Departamento ou Director de programas académicos em prol do programa currícular e o seu desenvolvimento	Coordinator		x	x
Dar apoio a estudantes que tenham dificuldades a nível social, de saúde ou até mesmo de língua estrangeira com recursos didáticos	Coordinator		x	
Desenvolver o programa usando métodos apropriados de ensino e aprendizagem e avaliação, efetuando quaisquer modificações necessárias, e comunicar essas informações aos alunos	Director	x	x	x
Assegurar o bom funcionamento e gestão dos programas, bem como o seu planeamento futuro.	Director	x	x	x
Monitorizar e realizar procedimentos de avaliação e avaliar os panoramas de retenção dos alunos	Director	x	x	
Criar novas estratégias e possibilidade de propor alterações aos programas	Director	x	x	
Dar suporte a alunos com deficiência	Director			x
Gerir recursos e administrar novas admissões aos programas	Director	x		
Responde a orgãos externos e internos e dá feedback aos alunos das atividades curriculares	Director		x	x
Responsáveis pelo recrutamento, desenvolvimento, retenção e avanço na áreas da educação, investigação e serviços	Chair	x		x
Gerir orçamentos, gastos e supervisionar as transações do(s) departamento(s)	Chair	x		
Assegurar o bom funcionamento e gestão estratégica dos programas	Chair	x		x
Comunica diretamente com o Reitor, Assistente de Reitor e com os orgãos internos e externos	Chair	x		
Promover e gerir objetivos	Chair	x		
Coordenar e auxiliar no desenvolvimento das bibliotecas da universidade	Chair	x		
Responde ao assitente executivo ou Reitor	Chair			x
Revisão e discussão anual de desenvolvimento dos programas académicos e principais prioridades	Chair			x
Representação da Universidade em eventos relacionados com programas internos e externos	Chair	x		x

Appendix 3 – Roles distribution by role for USA, UK and AUS (translated to PT)

Funções	Program(me) Coordinator	Program(me) Director	Program(me) Chair
Gerir a revisão contínua de currículos, promover comercialmente e moritorizar requisitos dos programas, incluindo procedimentos para iniciar ou modificar programas académicos.	x	x	x
Focar na administração e assistência e à submissão atempada de requisitos e relatórios de apoio à gestão dos programas	x		
As tarefas e funções dos Program Coordinator podem variar conforme o Assistente de Departamento, Director de Departamento	x	x	
Gerir recursos e administrar novas admissões aos programas e organizar o calendário conforme o programa	x	x	
Rever documentação e gestão documental e administrativa	x		
Trabalhar em conjunto com o Assist. Departamento ou Director de programas académicos em prol do programa currícular e o seu desenvolvimento	x	x	
Dar apoio a estudantes que tenham dificuldades a nível social, de saúde ou até mesmo de língua estrangeira com recursos didáticos	x	x	
Desenvolver o programa usando métodos apropriados de ensino e aprendizagem e avaliação, efetuando quaisquer modificações necessárias, e comunicar essas informações aos alunos		x	
Assegurar o bom funcionamento e gestão dos programas, bem como o seu planeamento futuro.		x	
Monitorizar e realizar procedimentos de avaliação e avaliar os panoramas de retenção dos alunos		x	
Criar novas estratégias e possibilidade de propor alterações aos programas		x	
Responde a orgãos externos e internos e dá feedback aos alunos das atividades curriculares		x	
Gerir recursos e administrar novas admissões aos programas		x	
Dar suporte a alunos com deficiência	x	x	
Responsáveis pelo recrutamento, desenvolvimento, retenção e avanço na áreas da educação, investigação e serviços	x	x	x
Gerir orçamentos, gastos e supervisionar as transações do(s) departamento(s)			x
Assegurar o bom funcionamento e gestão estratégica dos programas		x	x
Comunica diretamente com o Reitor, Assistente de Reitor e com outros orgãos internos e externos		x	x
Promover e gerir objetivos			x
Coordenar e auxiliar no devenvolvimento das bibliotecas da universidade			x
Responde ao assitente executivo ou Reitor			x
Revisão e discussão anual de desenvolvimento dos programas académicos e principais prioridades		x	x
Representação da Universidade em eventos relacionados com programas internos e externos			x

Appendix 4 – Program coordination Themes Vs functions

Extraction Index	Functions Index									Themes
	A	B	C	D	E	F	G	H	I	
1.1; 1.3		x		x						Program and Course Contents
1.2;		x								Sufficient Control Over Selection of Module
2.1; 2.3	x	x					x	x		Teaching Availability
2.2;	x	x								Course Coordination
2.4; 24.1; 24.3;	x	x						x		Student Outcome Level
2.5;	x							x		Student Attrition Rate
2.6; 22.1; 23.3; 24.2;	x	x						x		Student Achievements
5.1; 5.2;	x	x								Quality of teaching materials
7.1; 7.2; 7.3; 7.4		x							x	Program and Course Coaching
7.5;	x						x			Lecturers enrollment on Professional devel
11.1;		x								Students Interest
11.2; 17.1; 23.5;	x	x						x		Student Satisfaction
15.1; 16.1;	x	x						x		Student outcomes
15.2;	x	x	x					x		Student Time
15.3; 29.1;	x	x								Student Motivation
15.4;	x	x								Learning Materials
15.5; 15.6;	x	x								Providing teaching support
16.2;		x								LMS Availability
20.1; 23.8;	x	x						x		Student development level
20.2;	x	x						x		Class Achievements & Performance
23.1; 23.2;	x	x						x		Student Collaboration
23.4; 29.3;	x	x								Student Engagement
23.6;	x							x		Student Retention
23.7;	x	x					x			Student Attributes
24.4;	x									Prospective Student Level
29.2;	x									Student Effort
	21	21	1	1	0	0	3	11	1	

Extraction Criteria: (functions that appeared at least in 3 countries simultaneously)	All the content related to course chairing/directing or coordinating functions analysed before for the previous countries (US, UK, AU and PT): / Translated (Original)	Rank
	A - Ensure fulfilling of goals defined for the program, considering criteria for scientific and pedagogic effectiveness and efficacy (Assegurar o cumprimento dos objetivos definidos para o curso atendendo a critérios de eficácia e eficiência científica e pedagógica)	1st
	B - Contribute to adequate program operations, specifically by coordinating the courses syllabi and their academic activities (Contribuir para o bom funcionamento do curso, nomeadamente pela coordenação dos programas das unidades curriculares e das actividades lectivas)	1st
	C - Propose the creation or cancellation of courses (Propor a criação ou extinção de unidades curriculares)	4th
	D - Propose and comment on changes to the program's course listing (Propostas e dar parecer sobre alterações dos planos de estudos do curso)	4th
	E - External promotion of the program and coordinate the organization of application processes (Promoção externa do curso/programa de estudos e coordenar a organização dos processos de candidatura)	5th
	F - Represent the program at the institution's governing bodies (Representar o curso junto dos órgãos sociais da Universidade)	5th
	G - Draft proposals for staff hiring, and contract renewal or rescission (Elaborar as propostas de contratação de pessoal, de renovação e de rescisão de contratos)	3rd
	H - Draft an annual report, following models defined by the Scientific/Pedagogic Council of the institution (Elaborar um relatório anual de modelo a definir pelo conselho científico-pedagógico)	2nd
	I - Develop communication channels with students, towards permanent information update and exchange of viewpoints (Desenvolver canais de comunicação com os estudantes que permitam uma informação permanente e o debate de ideias)	4th

Appendix 5 – Theme and Cluster definitions (1/2)

Theme	Definition
Student Outcome level	Indicators that provide a level of the outcome of students in courses, typically a grade point average or similar.
Program and Course Contents	Indicators to assess the level of information provided through the program and the courses with resources on software that is used as a web library for student access. It can be a moodle platform with all the content related to the program and courses.
Learning materials	indicators used to demonstrate the maturity level of tools used to share program and course information.
Sufficient Control Over Selection of Module Leaders	Indicators that demonstrate the chair's ability to choose and select module leaders for a specific program.
Teaching Availability	Indicators that allow to determine how ready a teacher is to engage any concern during an academic program.
Quality of teaching materials	Indicators that provide the quality of teaching materials during an academic program or course.
Lecturers enrolment on professional development	Indicators to assess the professional improvement for teachers during a program or course.
Providing teaching support	Indicators to define the level of continuous provision to encourage the students to learn in the absence of a teacher during a program or course.
Course Coordination	Indicators linked to assess the level of course coordination by the lecturers.
Student Attrition Rate	Indicators used to measure student's leaving the academic education system in the first year. It can be analysed for a specific course or program, individual or group.
Student Achievements	Indicators that measure the amount of academic content a student learns in a given course or program.
Student development level	Indicators that assess the ability to execute its work independently. It involves factors such as the intellectual level, personality, motivation, skills, interests, study habits, self-esteem or the teacher-student relationship.
Program and Course Coaching	Indicators used to assess the amount of assistance and collaboration between lecturers and students among programs and courses.
Student Outcomes	Indicators that state the level of knowledge, skills and abilities an individual student should possess and can demonstrate upon completion of proposed statements and goals during an academic program or course.
Student Collaboration	Indicators that provide the ability to quantify the level of shared ideas and thoughts alongside academic stakeholders to achieve a shared objective.
Students Interest	Indicators that refer to the inclination of the student towards a particular subject, course or program.
Student Satisfaction	Indicators that relate to the wellbeing of the student during the academic program or course.
Student Time	Indicators related to the time spent by the student with the academic program.
Student Motivation	Indicators where the student is focused and well determined to achieve the academic goals.
LMS Availability	Indicators to support and ensure that a technical tool/software that lecturers encounters is brought into solution in a matter of time.
Class Achievements & Performance	Indicators related to the favourable results of a class as a whole and how they achieved that common goal.
Student Engagement	Indicators referring to non-observable behaviours that quantify the amount of work done that can support the assessment of other measures like the level of focus, availability and willingness that students show when they are learning or being taught.
Student Retention	Indicators that provide the level of academic completion and all who enrolled or registered on a program/course (including any who have withdrawn or cancelled).
Student Attributes	Indicators that quantify the number of traits a specific student has, allowing to assess if the student cooperates, helps and overcomes all the challenges trough the academic program showing its strengths, performance and skills
Prospective Student Level	Indicators that show the student strengths and core abilities that allows to be highly considered in the future to enrol a specific academic program or course.
Student Effort	Indicators that refer to observable behaviours during the academic year whether a student tries hard, asks for help, and/or participates in the program.

Clusters	Definition
Syllabus and Contents	Indicators that relate to summary of topics which will be covered during an academic course or program and all the content provided by the academic board (program coordinator, lecturer).
Student Achievements & Performance	Indicators that provide a level of the outcome of students in courses and measurements of the amount of academic content student learns.
Program and Course Communication	Indicators that allow to develop the communication between students and lecturers that helps them better understand the course and program.
Lecturers Quality and Availability	Indicators that affect lectures and lecturers regarding time, resources and materials.
Program and Course Management	Indicators to determine how to run, support and govern a specific academic program or course.
Student Ratings	Indicators associated to a specific student to identify an overall level of appraisal or classification during an academic program or course.

Appendix 6 – Clusters Grouped among Themes and mapped by program coordination roles

Extraction Index	Functions Index									Themes	Clusters
	A	B	C	D	E	F	G	H	I		
1.1; 1.3		x		x						Program and Course Contents	Syllabus and Contents
1.2;		x								Sufficient Control Over Selection of Module	Program and Courses Management
2.1; 2.3	x	x					x	x		Teaching Availability	Teaching Quality and Availability
2.2;	x	x								Course Coordination	Program and Courses Management
2.4; 24.1; 24.3;	x	x						x		Student's GPA	Student Ratings
2.5;	x							x		Student Attrition Rate	Student Ratings
2.6; 22.1; 23.3;	x	x						x		Student Achievements	Student Ratings
5.1; 5.2;	x	x								Quality of teaching materials	Teaching Quality and Availability
7.1; 7.2; 7.3; 7.4		x							x	Program and Course Coaching	Program and Course Communication
7.5;	x						x			Teachers enrollment on Professional develo	Teaching Quality and Availability
11.1;		x								Students Interest	Student Ratings
11.2; 17.1; 23.5;	x	x						x		Student Satisfaction	Student Ratings
15.1; 16.1;	x	x						x		Student outcomes	Program and Course Communication
15.2;	x	x	x					x		Student Time	Student Ratings
15.3; 29.1;	x	x								Student Motivation	Student Ratings
15.4;	x	x								Learning Materials	Syllabus and Contents
15.5; 15.6;	x	x								Provisioning help on teaching	Teaching Quality and Availability
16.2;		x								LMS Availability	Program and Courses Management
20.1; 23.8;	x	x						x		Student Performance	Student Ratings
20.2;	x	x						x		Class Achievements & Performance	Program and Courses Management
23.1; 23.2;	x	x						x		Student Collaboration	Program and Course Communication
23.4; 29.3;	x	x								Student Engagement	Student Ratings
23.6;	x							x		Student Retention	Student Ratings
23.7;	x	x					x			Student Quality	Student Ratings
24.2;	x									Learner Achievement	Teaching Quality and Availability
24.4;	x									Students Potential	Student Ratings
29.2;	x									Student Effort	Student Ratings

Appendix 7 – List of program coordination roles without duplicates distributed by country (translated to PT)

Funções	Portugal	EUA	Reino Unido	Austrália
Assegurar o cumprimento dos objetivos definidos para o curso atendendo a critérios de eficácia e eficiência científica e pedagógica	x	x	x	x
Representar o curso junto dos órgãos sociais da Universidade	x		x	x
Contribuir para o bom funcionamento do curso, nomeadamente pela coordenação dos programas das unidades curriculares e das actividades lecti	x	x	x	x
Propor a criação ou extinção de unidades curriculares	x	x	x	x
Fazer Propostas e dar parecer sobre alterações dos planos de estudos do curso	x	x	x	x
Elaborar as propostas de contratação de pessoal, de renovação e de rescisão de contratos.	x	x		x
Promoção externa do curso/programa de estudos e coordenar a organização dos processos de candidatura	x	x	x	x
Elaborar um relatório anual de modelo a definir pelo conselho científico -pedagógico	x	x		x
Avaliar o desempenho dos docentes	x			
Desenvolver canais de comunicação com os estudantes que permitam uma informação permanente e o debate de ideias	x		x	x
Vice-coordenadores para coadjuvarem nas funções de coordenador	x			
Dar suporte a alunos com deficiência				x
Gerir recursos e administrar novas admissões aos programas	x	x		
Gerir orçamentos, gastos e supervisionar as transações do(s) departamento(s)		x		
Comunica diretamente com o Reitor, Assistente de Reitor e com os orgãos internos e externos		x		x
Promover e gerir objetivos	x	x		
Coordenar e auxiliar no devenvolvimento das bibliotecas da universidade		x		