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Universidad
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**Doctoral Programme in
Communication, Information and Technology in the
Web Society**

**UNDERSTANDING QUALITY PERCEPTIONS IN
HIGHER EDUCATION: A SYSTEMATIC REVIEW OF
QUALITY VARIABLES AND FACTORS FOR LEARNER
CENTRIC CURRICULA DESIGN**

Doctoral Thesis submitted by

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Emmanouil Varouchas: *Understanding Quality Perceptions in Higher Education: A Systematic Review of Quality Variables and Factors for Learner Centric Curricula Design*

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TO WHOM IT MAY CONCERN

The supervisors of the Doctoral Thesis UNDERSTANDING QUALITY PERCEPTIONS IN HIGHER EDUCATION: A SYSTEMATIC REVIEW OF QUALITY VARIABLES AND FACTORS FOR LEARNER CENTRIC CURRICULA DESIGN written by EMMANOUIL VAROUCAS (presented in the Doctoral Programme **Communication, Information and Technology in the Web Society**), Dr Miguel Angel Sicilia Urbán and Dr. Salvador Sánchez Alonso report that the thesis satisfies the scientific requirements of originality and methodological rigour to be defended before an examining committee. The supervisors have also taken into account the favourable annual assessment reports of the doctoral candidate, who has obtained the research competencies set out in the doctoral programme.

Signed.: Miguel Angel Sicilia & Salvador Sánchez Alonso

Alcalá de Henares, 30 January 2019

TO WHOM IT MAY CONCERN

The Coordinator of the Academic Committee of the Doctoral Programme **Communication, Information and Technology in the Web Society (D430)** is pleased to report that the Doctoral Thesis UNDERSTANDING QUALITY PERCEPTIONS IN HIGHER EDUCATION: A SYSTEMATIC REVIEW OF QUALITY VARIABLES AND FACTORS FOR LEARNER CENTRIC CURRICULA DESIGN written by

EMMANOUIL VAROUCAS under the supervision of Dr Miguel Angel Sicilia Urbán and Dr. Salvador Sánchez Alonso satisfies the scientific requirements of originality and methodological rigour to be defended before an examining committee. The Academic Committee has also taken into account the favourable annual assessment reports of the doctoral candidate, who has obtained the research competencies set out in the doctoral programme.



Signed.: Miguel Angel Sicilia

"When you can measure what you are speaking about, and express it in numbers, you know something about it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts advanced to the stage of science."

— Lord William Thomson Kelvin, 1883

Abstract

The provision of high quality undergraduate and postgraduate programs worldwide requires a holistic, deep understanding of variables and factors that contribute to the value perceptions of students, faculty and administrators. In the literature related to quality assessment there is a critical gap in research works related to the convergence of students and administrators' perceptions.

This study involves in-depth literature review analysis of variables related to quality in higher education which includes the presentation of a 3-tier initial research model for the methodological framework of quality integration in higher education.

This research also intends to provide a holistic discussion on Key Performance Indicators (KPIs) related to quality in higher education using two research tools. The first one is related to a structured agenda for a qualitative interview targeted at higher education administrators. The second is related to a quantitative research model that analyzes the relations of various quality factors.

Finally, a last round of qualitative interviews with higher education administrators and professors is used as a promising vehicle for advancing towards the formulation of KPIs based on their understanding of the different independent dimensions of the quality construct.

The KPIs outcome provide valuable insights into improving teaching, learning assessment and eventually lead to sustainable curricula. Research findings outline the significance of time invested for designing and updating a course, indicate that technology enhanced learning solutions are perceived as key quality drivers, and point out the need to align courses with industry requirements and real-world problems. Additionally, findings indicate that the quality and impact of teaching and learning is promoted by the multi/inter disciplinary character of a course, the engagement of students in interactive discussions and student research as part of summative assessment.

The main contribution of this research is an analytic discussion of perceptions of higher education administrators and professors about quality, leading to significant enrichment of the relevant literature. A set of innovative generic KPIs that can be used in multidimensional quality assessment in higher education is eventually proposed.

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January 2019



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1. Introduction

The introduction of innovations in Higher Education (HE) is a key demand of our times. The pace of change in the business world and in the industry as well as the new competencies and skills of students, together with a great number of opportunities and alternative options for personal development and training pose critical challenges to the design of policies and strategies in higher education. Institutions in higher education continuously strive to develop and deliver impactful educational programs. At the same time, they should continue to fulfill their mission to educate students in basic applied subjects and in parallel respond to the need of equipping students with new skills. For this reason, Higher Education Institutions (HEIs) perform periodical curricular reviews adhering to internal and external quality assurance systems. Without adherence to the quality assurance system, it is impossible for any institution to know how well it is performing (Beckford, 2002). The subsequent curricular reforms are of transformative nature preparing graduates to tackle with the challenges of globalization, unemployment and vanishing professions. For these reforms to lead to sustainable curricula, the integration of quality into educational programs is instrumental. In the various perspectives that can be found in the literature, the holistic converging critical success factor is quality.

The interdisciplinary examination of quality in the literature of higher education research is worthy of note. According to Tsinidou et al., (2010) academics and researchers in higher education have posed different views of quality, each one with a corresponding definition: exceptional, perfection, as fitness for purpose, value for money (Harvey and Green, 1993), the stakeholder perspective of quality (Middlehurst, 1992), degree to which the previously set objectives are met (Vroeijenstijn, 1992). According to Doherty (2008), the concept of quality is still frequently misrepresented, misunderstood, or both, by many academics. Researchers note that the quality perception depends on the perspectives of various stakeholders: academic community and its disciplinary bodies, students as consumers, employers, professionals/professional establishments, governmental bodies, etc. (Barnett, 1994; Houston, 2007). Additionally, different researchers examine different issues of subjectivity of the quality of higher education and its assessment (Harvey, 2002; Cheng, 2003). Making a synthesis of the researchers' views, it is evident that it is hard to

achieve a degree of objectivity in the quality of higher education, which is a subjective phenomenon per se (Juceviciene, 2009). The analysis of the “subjective phenomenon” of quality (Juceviciene, 2009), has indicated two dominant and complementary perspectives:

- from one perspective, quality is anticipated as a resulting outcome of many contributing factors in which well documented systems for their measurement attach values (Dew, 2009). From a practical point of view, transparent mechanisms for the measurement of quality need to be established.
- from the other perspective, quality is perceived as a continuous improvement process (Dew, 2009 and Singh, 2010), thus it is important to clarify and to support all the transformative stages that constitute the life cycle of quality development within an academic institution. This second approach is quite complex in terms of conceptual modelling requirements, and because of the variety of stakeholders and interactions evident in an academic institution.

This research by inception focused on the development of a research proposition where the two approaches can be integrated. For this purpose, the emphasis of this research is on knowledge dissemination as an enabler of quality in higher education institutions both in terms of value components and processes.

The systematic justification of a research model for the study of the phenomenon of quality in higher education faces the following challenges:

- The understanding and complexity of knowledge flows and dissemination activities of data elements that justify quality perception for students, faculty and administrators
- The understanding of the workflow and the systems design of quality as a knowledge management process.
- The thorough study of higher education administration novel approaches to quality management and decision support.
- The integrated analysis, synthesis and unique value proposition of these complementary methodological and theoretical contributions to a novel, applied framework for the management of quality in higher education powered by information and communication technologies.

Considering the above points, the three basic pillars supporting the conceptualization of this research can be found below in Figure 1 (Varouchas et al., 2016):

1. Knowledge management perspective: with an emphasis paid on the dissemination of knowledge within academic institutions in various formats and in different contexts, the main interest is on the contribution of flexible and dynamic knowledge dissemination to the total quality management in higher education and to the higher education performance.
2. Quality Management perspective: the intention is to analyze in depth the literature on Quality theories and Total Quality Methodologies in the context of higher education. The intention is to exploit the collective wisdom and to contribute on a flexible dynamic assessment model, aiming to promote the performance within a modern academic institution.
3. Higher Education Perspective: the second important contribution of this research is the analysis on how knowledge dissemination can improve Decision Making in an academic institution as well as it promotes innovation strategies towards sustainable development. The research intends to provide a discussion on Key Performance Indicators (KPIs) related to quality and suggests ways to achieve a transformative stance by providing the context for the application and diffusion of quality metrics in teaching and learning.

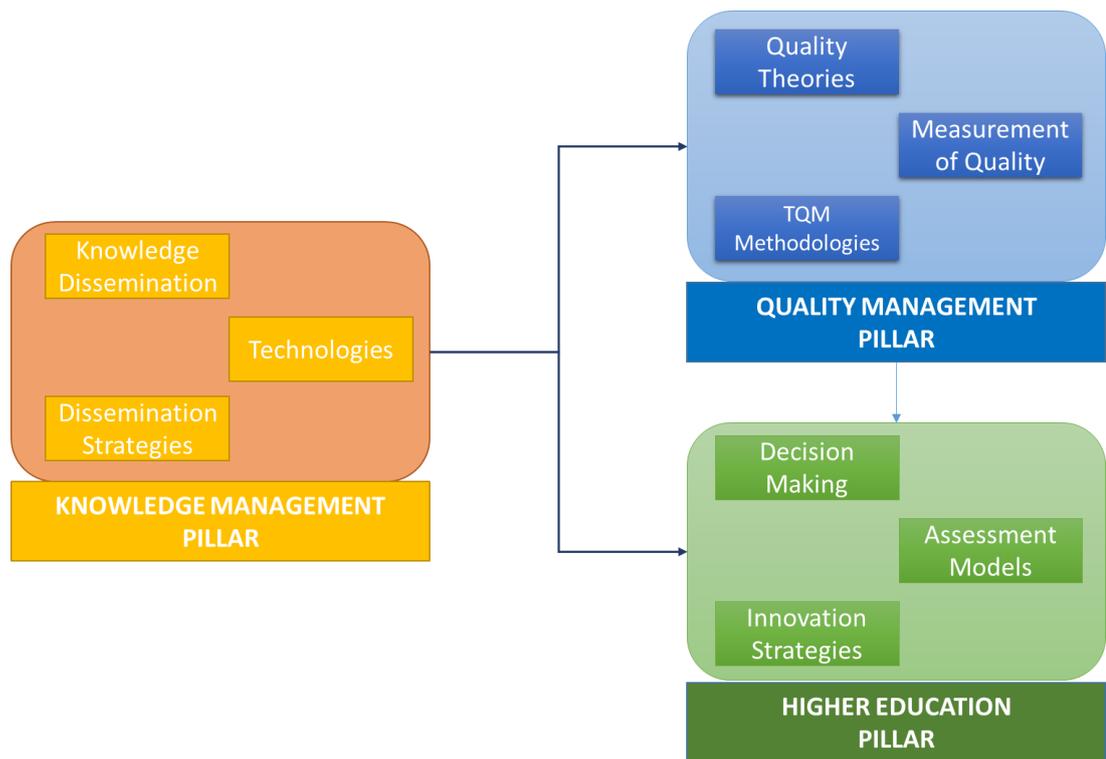


Figure 1. An interdisciplinary approach to quality perceptions in higher education

The motivation for this research is anchored to the following observation supported by various bibliographical references (Asif et al, 2013; Lytras et al, 2017; Vidovich et al, 2006; Zhang et al, 2017; Zhuhadar et al, 2014):

- Lack of applied methodologies focusing in the integration of content delivery, curriculum design and adoptive evaluation in higher education
- Need for better management tools for administrators of higher education
- Need to inform the curriculum design process through a learning centric focus
- Investigation of effective knowledge dissemination methods for tacit knowledge in academia with the support of innovative learning management systems.

2. Problem and objectives

2.1 Research problem

The main research problem addressed in this PhD study is codified as follows: how novel knowledge management approaches can be integrated in the decision support mechanisms of higher education institutions based on the perceptions of various stakeholders (in this case, faculty and administrators) about quality. According to studies conducted to tackle with the challenge of quality improvement in HEIs, Quinn et al. (2009) identified “measuring customer quality perceptions” as one of the elementary difficulties in this process.

In a recent study entitled “*Advanced decision-making in higher education: learning analytics research and key performance indicators*”, Lytras et al (2018), emphasize that in our times “an integrated ecosystem of analytics, targeting the understanding of learners’ behaviour and the enhancement of advanced decision-making in education is one more challenge. Within this context, advanced data-mining capabilities, techniques related to social networks analysis and sentiment analysis promote the strategic integration and impact of learning analytics”. In close relevance to this challenge, the focus of our study is on the application of quantitative metrics for quality features in higher education.

Waheed et al. (2018) in a thorough study entitled, “*A bibliometric perspective of learning analytics research landscape*”, elaborate on an extensive integrated review of literature related to Learning analytics and the key finding in their study is that “more recent trends in the field are the tools that tap into Big Data analytics and data mining techniques for more rational data-driven decision-making services. A future direction research depicts a need to integrate learning analytics research with multidisciplinary smart education and smart library services”. This is another aspect of our research problem. We are looking for novel insights and novel proposition for the integration of learning analytics research towards advanced decision making in higher education. Our focus on quality-driven learning analytics that are capable for supporting higher education administration are in the center of our research problem and study.

The overall purpose of the study is to justify a fully functional ecosystem of quality features and measurable key performance indicators for quality integration in higher education.

Zhang et al. (2018) in “*Mapping the study of learning analytics in higher education*” add more insights to the specification of our research problem. In their thorough and systematic mapping of learning analytics research they “use bibliometric and visualization methods to review the literature, in order to highlight the development of learning analytics in higher education. Using bibliometric analysis, their study depicts the development process of the main methods used in learning analytics, and summarize the current situation in this field, which increases the level of understanding provided by those studies. Finally, they summarize the research hotspots and study trends”.

One of the key areas is indicated as Learning Analytics for decision making. It is a challenge to capitalize on this finding and to build a research methodology capable of codifying our research methodology towards addressing the need to justify and to implement learning analytics systems with emphasis on quality of higher education and advanced decision making capabilities of higher education administrators.

Troisi et al. (2018), expand on the context of our research problem by putting emphasis on behavioral aspects of learning analytics research. In their work entitled “*Big data and sentiment analysis to highlight decision behaviours: a case study for student population*”, they state that “a big data analysis has been performed through ‘TalkWalker’, a tool based on the algorithms developed in the context of Social Data Intelligence, which allows understanding the sentiment of a group of people regarding a specific theme. The data have been extracted by drawing on published posts from anywhere in the world over a 12-month period from many online sources. According to the findings, the main variable capable of influencing the choice of University is training offer, followed by physical structure, work opportunities, prestige, affordability, communication, organization, environmental sustainability. The study establishes an innovative research agenda for further studies by proposing the elaboration of a systems and process-based view for higher education.”.

Yago et al (2018) in “*Competence-based recommender systems: a systematic literature review*” also highlight the direct integration of learning analytics with personalized

learning and competence building systems. As they state in their research study “competence-based learning is increasingly widespread in many institutions since it provides flexibility, facilitates the self-learning and brings the academic and professional worlds closer together. Thus, the competence-based recommender systems emerged taking the advantages of competences to offer suggestions (performance of a learning experience, assistance of an expert or recommendation of a learning resource) to the user (learner or instructor). From this perspective, our research problem serves the purpose of formulating suggestions and learning content customization based on qualitative features valued by learners.

The complementary aspects of our research problem set the context of the whole research. These aspects are highlighted at a glance as follows:

- The focus of our study is on the application of quantitative metrics for quality features in higher education.
- We are looking for novel insights and novel proposition for the integration of learning analytics research towards advanced decision making in higher education. Our focus on quality-driven learning analytics that are capable for supporting higher education administration are in the center of our research problem and study.
- The overall purpose of the study is to justify a fully functional ecosystem of quality features and measurable key performance indicators for quality integration in higher education.
- It is a challenge to capitalize on previously stated findings and to build a research methodology capable of codifying our research methodology towards addressing the need to justify and to implement learning analytics systems with emphasis on quality of higher education and advanced decision making capabilities of higher education administrators. We set emphasis on behavioral aspects of learning analytics research which allows understanding the sentiment of a group of learners
- Our research problem also need to formulate suggestions and learning content customization based on qualitative features valued by learners.

As discussed in the introduction there is a clear gap in a holistic approach of a perceptions-driven workflow for the codification of quality features that should be integrated in higher education. In other words, the theoretical discussion of quality should be also interpreted with empirical evidence from the key stakeholders of higher education. For this purpose, in the following section, the objectives of this research are outlined.

2.2 Objectives of the research

The overall aim of this research is the understanding of quality perceptions in higher education through a systematic empirical analysis of quality variables and factors for high quality learner-centric curricula design. As discussed in the previous introduction a number of dimension set the challenge to define measurable analytics and key performance indicators capable of supporting sophisticated, advanced decision making in higher education. This research aim divides into the following three specific objectives (Varouhas, et al 2018):

O1: The Methodological Framework for Quality Perceptions in Education, a multipurpose quality measurement tool based on twenty-two (22) factors of quality (Varouchas and Sicilia, 2017). This is a sound contribution that aims in organizing and strategizing the workflow for quality assurance plans in institutions of higher education. It also serves as an advanced decision-making tool for higher education administrators and consultants. This framework is presented in Section 7, Figure 3.

O2: A generic core-extensible set of KPIs consisting of twelve (12) well defined metrics. This second theoretical construct sets the basis for future enhancements and for a new era of advanced multidisciplinary measures for quality in higher education. It is a novel contribution that adds to the body of knowledge in Learning Analytics and Technology Enhanced Learning domains. The second construct is presented in Section 9, Table 4.

O3: An integrative model for the study of quality perceptions in higher education as presented in Section 9, Figure 8. This model provides the basis for future research in the field of Learning Analytics and sustainability in higher education curricula (Varouchas, Sicilia, Sánchez-Alonso, 2018b).

More specifically, this PhD thesis has a three-fold multidimensional contribution to the core body of knowledge of Technology Enhanced Learning, Learning Analytics and Information Systems research.

First, the contribution to the body of Theory of Learning Analytics Research - the deployed scientific research methodology resulted to three key theoretical constructs: Additionally, a novel multidisciplinary contribution in the intersection of Information Systems and Behavioral Sciences, related to the unique justification of a perception-based process of added value in KPIs and analytics. This is one more significant contribution that is intended to be published as an output of this PhD thesis.

Second, the contribution to the practice of Learning Analytics Research - the main outcomes and contributions of this study as explained in the previous section, enable various implementations and future research directions that integrate academic research with industry solutions. Additionally, the interpretation of this research places challenges to quality assurance administrators in higher education institutions and to organizations providing accreditation services. In section 13, the inspirations regarding future research are presented.

Third, the contribution to higher education policy making and decision making - the theoretical contributions of this thesis have the following significant implications to advanced decision making in higher education:

- 1) They can support quality assurance initiatives
- 2) They can support an evolving ecosystem of measurable KPIs and analytics permitting a new methodological and applied framework for quality assurance
- 3) They integrate student-centric and faculty-centric perceptions on quality with significant impact on the design of curricula and academic programs.

3. Background – comparative literature review

3.1 An overview

The study of quality in higher education can be analyzed from different lenses and perspectives. The behavioral character of learning together with the demand to apply total quality management approaches to education makes the context of analysis for this thesis more complicated. Towards an integrated contribution to the design of qualitative educational programs, there is a need to integrate instruction, learning content development with transparent quality features and administrative processes towards advanced decision making (Dew, 2009). Thus, this research on quality in higher education is related to several reference disciplines:

- a. Knowledge Management
- b. Learning Management Systems
- c. Total Quality Management
- d. Management of Higher Education.

The multidisciplinary integration of these areas is challenging because it adds a cross-functional transparent approach related to Total Quality Management and Quality Assurance to a discipline like education. From the diverse literature of these theoretical domains the following three areas summarize the priorities and the context for the research contribution:

- Studies on quality assurance in higher education (Jena, 2018); (Capatina et al., 2018)
- Studies on perceptions of key stakeholders in higher education (Faganel, 2010)
- Evolutionary – development model for sustainable higher education (Sterling, 2004).

Additionally, the strategic objective was a thorough study of literature published in indexed academic journals related to the following four areas of interest.

1. Quality assurance models, methods and tools in higher education (Hoecht, 2006)
2. Knowledge Dissemination Models for the provision of targeted learning content especially related to tacit knowledge components (experiences, know how, industry practices, best practices) (Lytras et al., 2016, 2017)

3. Performance measurement in higher education (Lacave et al., 2018)
4. Participatory theories of curriculum design in STEM (McFadden, 2017).

Drawing on studies on data analytics and their correlation with teaching, learning and curriculum and with how students learn (Lytras et al., 2018; Waheed et al., 2018; Zhang et al., 2018), the commonly stated notion indicates that enhancing the curriculum, requires understanding of students' learning behavior. To achieve the latter, development of KPIs and application of quality metrics for measuring these KPIs. The university constituent primarily benefited is the administration which will realize that decision making will be supported and significantly improved through the quality metrics. Additionally, these studies highlight the need for establishing quality features in the curriculum design, based on which KPIs will be measured.

In continuation to the above and in regard to decision making in higher education, studies have shown that an automated system with well-defined processes serves the purpose of data collection on quality metrics, calculation of KPIs and generation of reports for decision making purposes. Through this automated system, academic administrators will be given the opportunity to perform data mining processes in order to identify and reveal hidden behaviors, trends and perceptions (Troisi et al., 2018; Yago et al., 2018). Subsequently, the two usually conflicting views of the university - the academic and the administration - will be brought closer to better serve the university mission.

3.2 Perception of quality in higher education

Based on the literature review, the point of Louise Morley (2003) that globalization has had an impact on higher education has become a commonly shared view among academics and has been significantly affecting research in higher education. Additionally, globalization has lead higher education institutions to establish robust policies and measures for quality assurance applied to faculty development, research funding, academic program development and technology. From many perspectives found in the literature, quality is a holistic converging critical success factor in the design of policies and strategies in higher education.

Nevertheless, university quality and its measurement have been on the agenda of university policy since the 1980s (Vroeijenstijn 1995). McDonald (2007), in his notion

on quality assurance, claims that “in higher education, quality should not be rigidly ‘defined’, but seen as a flexible notion used in ways that are appropriate for the particular circumstances”. Additionally, quality policies should be tailor-made to institution’s goals and objectives, mission and stakeholders affected. To this end, the view of De Ketele (2008) that quality is a concept difficult to define due to its multidimensional and relative nature is acknowledged. In the same sense, Sanyal and Martin (2007) suggest that because quality means different things to different stakeholders and it is difficult to reconcile all of them, so the definition of quality is a political process. Therefore, the “Europe 2020 Strategy” (European Commission, 2010) and other EU initiatives call for more excellence in Europe’s higher education institutions in order to improve their performance, international attractiveness and competitiveness. In this context, “the relevance of quality in higher education gained momentum”, as explained in a study requested by the European Parliament in 2015 (Wächter, 2015). According to some of the key findings in most of the European countries the institutional assessments have become important, while study program accreditations are mandatory. The program assessments apply to content related indicators and the institutional assessments apply to internal institution structures and policies.

Nevertheless, according to the Irish Higher Education Authority report towards a performance evaluation framework (Higher Education Authority, 2013), evaluating assessment of teaching and learning in higher education is focused to measure the inputs (students’ prior academic attainment, academics’ qualifications, the international mix of staff and students) and outputs (retention rates, degree results, graduates’ career prospects) in this area, but the ultimate goal to evaluate the “value added” by the education remains to be a significant challenge. For example, “the data provided in the profiles on student numbers, disciplinary mix, participation, and internationalization also provides some insight into the teaching and learning environment in terms of the levels and modes of study undertaken. A sustained appreciation of the limitations of metrics will be especially important in areas as essentially qualitative as teaching and learning. For example, although the initial profiles provide accurate information on the numbers of part-time and flexible-learners undertaking programs of higher education, they do not capture how extensively and how well technology is being used to enrich and enhance teaching and learning throughout the higher education institution”.

Additionally, according to Deloitte's Center for Higher Education Excellence article series (Dovey Fishman et al., 2017), the implications behind changing demographics, force colleges and universities "to find new ways to effectively support their students on the path to graduation. As students with "nontraditional" backgrounds become more of the norm, traditional support structures, ... will likely become inadequate". Therefore, Deloitte proposes "some innovative and effective strategies for improving student success across each dimension of the student experience and describe the foundational capacities that institutions should develop if they are to drive meaningful improvements". These proposals are integrated in a framework on "Improved Student Success Outcomes", built on four pillars: High-impact learning, comprehensive support services, student-focused operations and strategic external partnerships.

Based on this framework (Dovey Fishman et al., 2017), this research project focuses on the student success levers and in particular on the high-impact learning pillar, on what it consists of and how it can be measured to be able to further improve it. According to the above framework, among the important elements to explore in this area are : a) blended learning ("brick-and-mortar," in-person instruction with asynchronous, self-paced online learning), b) adaptive learning for personalized education (using "analytics to tailor learning to a student's current level of mastery, anticipating what content and resources each student needs at each point in the course"), and c) competency-based education models (as an attractive alternative to the traditional credit-hour model is the one verifying the actual mastering of the material) (Dovey Fishman et al., 2017).

Apparently, Deming (2006) borrows ideas from the world of business to justify the need for quality in higher education. He says: "How can quality of teaching, learning and curriculum be improved? Is it enough to say that we as tutors, teachers, professors, staff or management of an educational institution are doing their best efforts? It is almost obvious that if everyone is doing their best efforts towards a different direction, efforts most probably will not bring the expected result. For individual best efforts to be effective, there is a need of a common vision, goals, and guidance. Ultimately there is a need for an orchestrating plan and a specific process towards the achievement of better quality".

Against Deming's ideas, McDonald's (2007) notion on quality assurance is posed: "Quality in higher education is not the simple concept that it can be in commerce, and

industry. Quality may have one or more meanings, depending on the stakeholder, the relevant goals and objectives, and the mission of the institution. Thus, in higher education, quality should not be rigidly ‘defined’, but seen as a flexible notion used in ways that are appropriate for the particular circumstances”.

As university education is evolving, McLean (2006) points out that “individuals and institutions can be transformed for better and worse whether or not we are seeking radical change”. Drawing on McLean’s point, the academic ‘transformation’ encompasses innovative teaching methods and pedagogies, more technology-infused curricula and measurement of the above.

On another note and referring to sustainable curricula, according to Sterling (2004), sustainability is not just another issue to be added to a curriculum, but rather can be a gateway to a different view of curriculum, pedagogy, organizational change, policy, and ethos. At the same time, HEIs are expected to play a significant role in contributing to creating a more sustainable world through their major functions of education, research and outreach (Fadeeva and Mochizuki 2010). Considering the point of views of Sterling (2004) and Fadeeva and Mochizuki (2010), there is evident correlation between quality education and sustainable development. One of the challenges academic institutions in higher education are facing is that of planning for and ensuring sustainability of their academic programs. This is probably the biggest challenge since in its epicenter lies the development of quality curricula - the core competency of higher education institutions. The term “sustainability” is used with emphasis on how higher education curricula can become more sustainable, and not in the context of education for sustainability, which mainly involves environmental theories and practices

In further reviewing the literature of higher education research, two dominant complementary perceptions of quality have been identified. From one standpoint, quality is anticipated as a resulting outcome of many contributing factors in which well documented systems for their measurement attach values. Consequently, the measurement and management of quality is a matter, which keeps away higher education stakeholders from an agreement to apply a standardized set of tools and measurable indicators, notably customer perception, value and repurchase intention have been investigated lately as purely external ones (Dlačić et al., 2014) but here focus

is placed on the internal factors. One critical research problem associated with this approach is directly linked to the perceptions of value metrics of overall quality, which then may be connected to perceptions and measures of value as perceived by students (Woodall & Resnick, 2014). From a practical point of view, transparent mechanisms for the measurement of quality and control mechanisms need to be established. From the other standpoint, quality is perceived as an improvement process (Singh, 2010), thus it is important to clarify and to support all the transformative stages that constitute the life cycle of quality development within an academic institution. This second approach is quite complex in terms of conceptual modelling requirements, mainly because of the great variety of institutions' mission, goals, and legislation under which the latter operate. In the following section, the drivers and methodological approach for the study of quality perceptions in higher education are presented.

The notion of quality in higher education we have formulated from the stand point of an educator involved in teaching, student advising, and designing courses and academic programs, is that quality in education is a multidimensional issue having the following interwoven dimensions (Varouchas, 2015):

- quality in the curriculum
- quality in teaching
- quality of the country's education system
- quality in facilities, academic resources and support
- quality in external quality assurance framework
- quality in internal quality assurance framework
- quality in learning outcomes and graduates' knowledge and skills.

This notion has been primarily informed by the teaching, research and academic administration experience acquired in higher education. To maintain high quality standards in all dimensions, HEIs have the responsibility to adjust themselves and develop strategies to respond rapidly to the changes in student learning needs, emerging skills, legislation and global economy, and mandates from stakeholders. As a result, HEIs are faced with the need to reform many of their existing management practices and mindsets. To this end, key performance indicators is a fundamental concept in measuring performance in multiple contexts (Suryadi, 2007). Even though HEIs are

required to keep track of KPI's for external regulatory compliance purpose as well as for internal administration of resources, there is lack of a standardized set of KPIs measuring quality in multiple dimensions and especially quality in teaching, learning and curriculum. The main reason is that it is hard to capture in a KPI “qualitative indicators” like descriptions, observations, comparisons based on non-numerical data, assessment of the degree of students learning and the overall student experience from an academic program of study.

According to Chalmers (2008), these performance indicators typically do not involve generating the quantity of outcomes in the form of numerical data but measure complex processes and results in terms of their quality and impact. On the other hand, “quantitative indicators” are defined as those associated with the measurement of quantity or amount and are expressed as numerical values; something to which “meaning” or “value” is given by assigning it a number.

Also, the review of the literature shows that there are two main contested views regarding what are the priorities that universities must set for maintaining all dimensions of quality:

- (i) the view of Vidovich and Currie (2006) on quality assurance and the priority of the need to ‘prove’ that what universities claim that their students will learn it is exactly what students are equipped with when they graduate; and
- (ii) the view of Filippakou and Tapper (2008) on quality enhancement according to which the less bounded nature of enhancement will contribute to the enrichment of the student learning outcome – in other words to ‘improve’.

Our research model is informed by both views since the aim is to justify the need for the creation of an instrument through which academic institutions will prove that they implement and use established quality frameworks, which produce KPIs for quality assurance and enhancement. At the same time, the research model is designed to collect the perceptions of academics regarding how quality factors are integrated into the development of curricula and in the process of teaching and learning.

4. Research methods

The methods of inquiry for the concrete objectives stated above are presented and justified in this section. The methodological approach which was adopted, comprised of eight steps (see Figure 2 below):

- Step 1: Literature review: overview of quality variables to be used in the design of a research tool (Sections 3 and 5).
- Step 2: Design of their initial research model mostly informed by the critical review of the literature (Section 4).
- Step 3: Focused qualitative research for perceptions of higher education administrators to inform and to update the initial of research model (Appendix A).
- Step 4: Revised research model informed by critical literature review and by qualitative analysis of perceptions of key higher education stakeholders (Sections 6 and 7).
- Step 5: Development of a research instrument for the collection of data on hermeneutic factors of quality - data collection from higher education academics in Greece and abroad (Appendix B).
- Step 6: Quantitative analysis related to learning analytics: application of data mining techniques to data collected (Section 8).
- Step 7: Focused qualitative research to confirm the validity of the model (Appendix C).
- Step 8: Integrative model for the study of quality perceptions in higher education and implications of the research (Sections 9, 10 and 11).

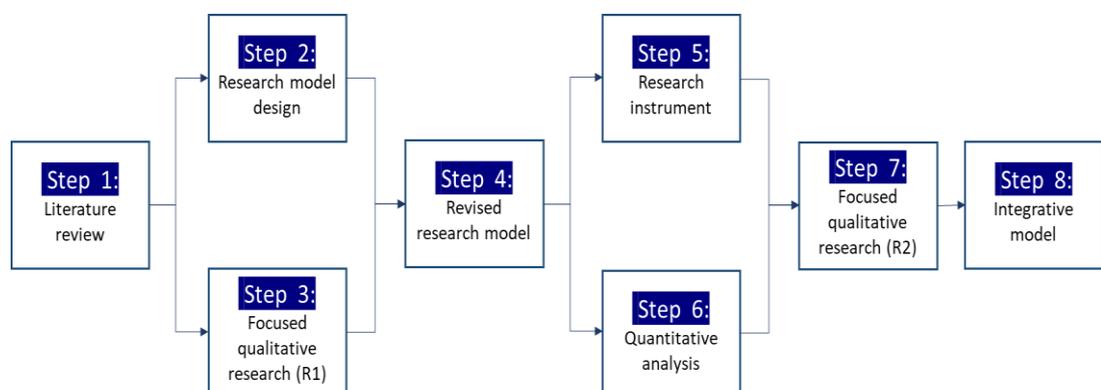


Figure 2. Research methodology steps

The basic dimensions for the design and the implementation of the research were the following.

Initially, as part of the review of the literature, research, gathering and classification of articles published in indexed impact factor journals for quality assessment in higher education, total quality management and knowledge dissemination in the last 10-15 years was performed in the fall of 2015 (Step 1 of the methodology). The initial research model was informed by the critical review of the literature and provided the basis for the two rounds of qualitative focused structured interviews.

The methodological steps as outlined in Figure 2 above, were used as input for an empirical research targeted to teaching staff and administrators. The objective was to capture their perceptions of quality variables and for this reason structured qualitative interviews were applied. As a result, several different priorities and perceptions were revealed, and the methodological framework was revised.

The research design included interviews with higher education administrators and teaching staff, all involved in the creation of new academic programs and courses. The main contribution was an analytic discussion of perceptions of higher education administrators and instructors about quality that updates significantly the state of the art of the literature in interesting dimensions. A mapping of quality perceptions was provided, and a theoretical model was constructed for the affordances of scholars to this perception.

In the fall of 2016, the first round (R1) of qualitative research was concluded through structured interviews with ten (10) higher education administrators and professors in Greece, aiming at a more thorough understanding of the perceptions on quality components in higher education and informing the initial research model (Step 3 of the methodology). More specifically, interviewees included academic department heads from the School of Business and the School of Liberal Arts and Sciences at Deree-The American College of Greece, all professors in various disciplines such as Information Management, International Business, Finance, Tourism and Hospitality, Psychology, and English. The outcome of their input was used to complement the literature review and shape a structured questionnaire, which formed the main instrument for the

collection of data from higher education community across the world (Step 5) and then for quantitative analysis (Step 6).

As an outcome, the initial research model was updated with the addition of a methodological framework for the quality integration in higher education, as outlined in Figure 2 above. A three-dimensional value space with twenty factors has emerged. The outcomes of this research work were used as input for the quantitative study. In fact, a list of 20 quality factors were exploited in three main dimensions of learning analytics namely: content, process and engagement. Key Performance Indicators were highlighted and further investigated.

In the fall of 2017, as indicated by Step 5 of the methodology, the quantitative study derived a 3-tier Content, Process, Engagement model with twenty quality factors, and highlighted a set of key performance indicators for further investigation (see Figure 3). In this way a 3-tier framework was developed to provide a context for further investigation. In the research work the concept of quality in higher education is explored as a multidimensional phenomenon with several informing factors. The integration of quality in higher education is multidimensional. Higher education administration, programs, courses, procedures and evaluation provide the context for the application and diffusion of quality metrics. In the following section the drafted framework is explained along with guidelines for the design of curricula based on the finding of the empirical research related to quality.

Following this, in the spring of 2018, a second round (R2) of qualitative research through focused structured interviews have been performed with thirteen (13) higher education administrators and professors from Greece and abroad, aiming at a more thorough understanding of the perceptions on quality components in higher education and at producing Key Performance Indicators (Steps 7 and 8 of the methodology). More specifically, interviewees included deans and academic department heads from the School of Business and the School of Liberal Arts and Sciences at The American College of Greece, and professors in various disciplines such as Information Management, International Business, Finance, Tourism and Hospitality, Psychology, and English.

Regarding the methodology adopted for analyzing the qualitative data gathered from the interviews, the Constant Comparison Method was used. Constant comparison assures that “all data are systematically compared to all other data in the data set” (O’Connor et al., 2008). As Maykut and Morehouse (1994) point out: “words are the way that most people come to understand their situations; we create our world with words; we explain ourselves with words; we defend and hide ourselves with words” (p18). Thus, in qualitative data analysis and presentation: “the task of the researcher is to find patterns within those words and to present those patterns for others to inspect while at the same time staying as close to the construction of the world as the participants originally experienced it. Qualitative data analysis involved identifying, coding, and categorizing patterns found in respondents’ perceptions was performed. More specifically, line-by-line analysis of the text of the responds has been performed, codes were given to words or phrases that represented units of data associated with a concept. Then, quality perceptions were grouped into categories that best fit the data. The categories that were apparent related directly to the questions asked in the structured interview.

As far as the number of participants is concerned, according to Baker, Edwards and Doidge (2012) the amount of qualitative data does not depend on the number of interviews but on the depth of the interview and how well the researcher uncovers participants’ thoughts. Additionally, a small number of participants can offer researchers insights into research projects that target participants from a specific group (e.g. department heads, faculty).

For the purposes of the research the following were the key integrative contributions:

- A multi-level instrument for Quality Measurement in Higher Education Administration
- A qualitative approach to Participatory Curriculum Design
- An applied research of Learning Analytics for Quality in HE.

5. Understanding quality perceptions in higher education

During reviewing of the literature, an important inclusion criterion was that the selected articles to be used in this thesis should discuss higher education quality in a comprehensive or broad view, as it attempts to complement studies that look at aspects as technology components (Sharma et al., 2017) or particular media for instruction (Zhang et al., 2017).

The initial research model was informed by the critical review of the literature and provided the basis for the focused structured interviews with ten higher education administrators in Greece, which provided a more thorough understanding of the perceptions on quality components in higher education (see Table 1 below).

Articles	Variables					Implication					Criticality
	Content	Technology	Collaboration	Performance	Innovation	Teaching	Knowledge dissemination	Decision making	Curriculum design	Social Networks	
A model for total quality management in Higher Education (Asif et al. 2011)	X		X			X	X	X	X		High
Quality assurance in Higher Education: analysis of grades for reviewing course levels (Rexwinkel, Haenen & Pilot 2013)	X		X			X			X		Medium
Quality Assessment in Higher Education using the Servqual model (Đonlagić & Fazlić 2015)		X	X					X	X		High
Quality improvement and redesign of performance measurement systems: an application to the academic field (Franceschini & Turina 2011)	X		X	X			X	X			High
An instrument for measuring the critical factors of TQM in Turkish Higher Education (Bayraktar, Tatoglu & Zaim 2008)		X	X	X			X	X	X		High
The measurement of the construct satisfaction in Higher Education (Alves & Raposo 2009)	X			X		X			X		High

Specific remedy for specific problem: measuring service quality in South African Higher Education (de Jager & Gbadamosi 2009)		X					X	X			Medium
Factors influencing assessment quality in higher vocational education (Baartman, Gulikers & Dijkstra 2013)							X				Medium
Developing measures for performance excellence: is the Baldrige criteria sufficient for performance excellence in Higher Education? (Asif, Raouf & Searcy 2012)	X		X	X		X	X	X	X		High
Improving the measurement of productivity in Higher Education (Massy, Sullivan & Mackie 2013)	X	X		X			X	X	X		High
The Social Media in Academia and Education Research R-evolutions and a Paradox: Advanced Next Generation Social Learning Innovation (Lytras et al, 2014)		X				X	X			X	Medium

Table 1: Perceptions on quality components in higher education.

Based on the outcome of the focused interviews regarding quality perceptions (Table 1), research variables and informing factors for the measurement of quality in higher education were classified in the following categories:

- a. Content
- b. Technology
- c. Collaboration
- d. Performance
- e. Innovation

Additionally, their implication in the following important value perceptions were clarified:

- f. Teaching
- g. Knowledge dissemination
- h. Decision making

- i. Curriculum design
- j. Social Networks

In the integrated quality framework section, the rich pictures of all the variables associated to these categories are presented and the key implications towards the construction of a research tool that became the basis for this empirical study is elaborated.

6. Integrating qualitative perceptions of higher education administration

An element in the complexity of implementing a quality assurance system in higher education is the required balance between efforts towards quality improvement and the needs, values and attitudes of academic administrators who play instrumental role in this implementation (Boyle & Bowden, 1997). The aforementioned point of view is supported by the view of Paliulis and Labanauskis (2015), whose perception of quality in higher education has at least two dimensions: structural (guidelines for quality management, definition of processes, instruments) and organizational value dimension (related to values skills and attitudes of members of the organization). On the same note, to improve quality, quality assurance systems need to take into consideration the needs, values and attitudes of academics. One way to achieve the latter is through measuring quality perceptions of academic administrators.

The detailed research design presented in the preceding section has supported the collection of a significant number of qualitative data from higher education administrators. In this section, the qualitative analysis of the data collected will be used with a threefold objective:

- First, to analyze the basic perceptions of higher education administrators and professors in terms of the complementary value components of quality. The objective is that the integration of their complementary aspects will enlighten a detailed mapping of quality metrics.
- Second, to reveal several concerns and limitations as perceived by administrators and professors related to the integration of the quality value components to the design of learning content and academic programs.
- Third, to emphasize on the understanding of hidden or existing relationships between quality perceptions and performance indicators from different perspectives. Thus, the next methodological step will lead to the clarification of several qualitative key performance indicators.

In the next paragraphs, a preliminary analysis of the basic findings is presented. The analysis of data related to the quality perceptions of administrators and professors is quite interesting. Several value components are revealed, and their interpretation can guide the justification of various initiatives in higher education organizations. In a

synthesis of their perceptions, the following aspects are considered as critical (Varouchas, Sicilia, Sánchez-Alonso, 2018a):

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Dimensions: Institutional / Individual Perceptions 2. Teaching/ Research Integration 3. Learning Objectives 4. Critical Thinking 5. Quality Reporting and Control 6. Content Quality 7. Skills Development focus 8. Interactivity / Collaborative teaching 9. Student Needs 10. Flexibility in Learning Designs and Programs 11. Discussing and agreeing teaching goals for students 12. Regularly meeting during the semester and deciding on issues that arise collaboratively 13. Linkage to Innovation 14. Standards Adoption 15. Guiding Principle and the Anticipated Outcome 16. Workflow Model: an integrated approach to processes such as recruitment, selection, training, development, work allocation, | <ol style="list-style-type: none"> evaluation, appraisal, reward, motivation and support of all faculty and staff 17. Critical Student Engagement 18. Knowledge Integration 19. Self-Reflective Practices 20. Technology Use 21. Motivation and Engagement 22. Innovative Methods 23. Industry Integration 24. Teaching Content 25. Teaching Strategies support (interactive lectures, class discussions, collaborative learning, problem-based learning, project-based learning, teaching through case studies and literature discussion, experiential learning – lab, field work–, visual-based learning, debates, flipped classrooms) 26. Interdisciplinary Integration 27. Problem Solving Capabilities 28. Skills building 29. Cultural Enhancement. |
|---|---|

A summary of the quality perceptions of interviewees and the key arguments provided by higher education administrators and professors is presented below per aspect/dimension of quality:

1. Institutional / Individual Perceptions - Teaching/Research Integration Learning Objectives (LOs) - Critical Thinking - Quality Reporting and Control:
 - At the institutional level, it is important to ensure that faculty engaged in teaching have the appropriate qualifications (e.g. PhD in related areas, research) and demeanor
 - At the individual professor level, it is important to inform teaching with research and to approach the course from an academic perspective as opposed to a practical one.
 - Instructional and assessment methods need to support/assess the course LOs and the latter must be aligned with the level. Throughout the course LOs must be oriented towards conveying critical thinking skills in addition to domain knowledge.
 - Quality assurance as it forces reflection and action for improvement.
2. Content Quality - Skills Development focus - Interactivity / Collaborative teaching: content should be updated to include in its design the academic disciplines students are pursuing. It should be focused on skills development. Moreover, interactive and collaborative teaching should be boosted for further engaging students. This perception is supported by Wanger (2005).
3. Student Needs - Flexibility in Learning Designs and Programs: quality of teaching and learning heavily depends on suitability of proposed courses to students' needs / characteristics e.g. learning styles. This means that all units of learning should be composed of components which are most suitable to students' needs - learning objectives / content, learning activities and learning environment, method of teaching. This perception is supported by Ferguson (2012).
4. Discussing and agreeing teaching goals for students: in advanced to senior level courses (Level-5 and Level-6), high level concepts should be taught with the aid of conceptual diagrams and flow charts. This perception is supported by Ferguson (2012).
5. Regularly meeting during the semester and deciding on issues that arise collaboratively:

- For the assessing student learning, assigning individual projects is an essential element to assess the understanding of the students' knowledge.
 - Recruitment of teachers is of paramount importance: they should be recruited following specific criteria like teaching experience, pedagogical/didactic background, industry experience; instructional design and strategy to ensure curricula and academic program coherence. This perception is supported by Bradley et al. (2015).
6. Linkage to Innovation - Standards Adoption: innovation and standards monitoring. Student's preparation and appropriate level standards and structure are required.
 7. Guiding Principle and the Anticipated Outcome - Workflow Model: an integrated approach to academic processes such as selection and recruitment of human resources, training, development, work allocation, evaluation, appraisal, reward, motivation and support of all faculty and staff:
 - Define quality in the higher education context as a guiding principle as well as the anticipated outcome of continuous efforts towards excellence and enhancement in all aspects of academic practice. Teaching and assessment are viewed as parts of a wider quality system from an education management perspective.
 - Therefore, quality enhancements and assurance procedures must apply in all parts of the system. If the question is how quality in teaching and assessment can be assured and promoted, the brief answer would be by ensuring that the whole system is geared towards promoting a quality outcome. This would include a purposeful approach to processes such as recruitment, selection, training, development, work allocation, evaluation, appraisal, reward, motivation and support of all faculty and staff. Furthermore, it would include purposeful specification of admissions criteria, targeted inductions to incoming and continuing cohorts, academic support mechanisms, academic regulations, academic infrastructure and facilities for students. This is again a very brief account of some of the components of an institutional approach to academic quality. Depending on how purposefully and competently the above are

implemented, various strategies for each component may work well towards promoting quality in all areas, including teaching and assessment.

8. Critical Student Engagement: critical engagement of students in learning via case studies, simulations, role playing, debates, education games and other methods. This perception is supported by Khan et al. (2017).
9. Knowledge Integration - Self-Reflective Practices: integration and application of theoretical knowledge into current issues and debates, use of self-reflective practices, authentic learning activities.
10. Technology Use - Motivation and Engagement - Innovative Methods - Industry Integration:
 - Motivating and engaging students in both knowledge input and output
 - Assessments need to be innovative, ensuring that students have acquired content related skills and knowledge, teamwork and communication skills as well as the ability to continuously improve themselves. This perception is supported by Jovanović et al. (2008).
 - Use of e-learning tools, from traditional LMS that are known to have an impact (Zheng et al., 2018) to the most innovative that are being studied (Park and Kwon, 2016).
 - Engagement with the market such as practical industry experience year or semester, projects and internships.
11. Teaching Content - Teaching Strategies:
 - Quality in teaching involves teaching content, which is associated with the design of the syllabus and the expertise of the instructor. In regard to teaching strategies, academics consider the use of innovative teaching approaches with a focus on pedagogies of engagement and active learning like interactive lectures, class discussion, collaborative learning, problem-based learning, project-based learning, teaching through case studies and literature discussion, experiential learning (lab, field work), visual-based learning, debates and flipped classrooms promote a culture of collaboration and sharing knowledge in teaching and

learning and not a competitive environment. This perception is supported by O'Flaherty et al. (2015) and Wagner (2005).

- Quality in assessment involves design assessments that promote an active learning approach and do not foster memorization, for example projects, critical thinking essays, group projects (Kulasegaram et al., 2018); development of good assessment rubrics for the evaluation of student work; achieving consistency and fairness in student evaluation among instructors; evaluating assessment strategies on a regular basis for effectiveness in terms of meeting learning outcomes and revise them, if needed.

12. Collaboration Enhancement - Interdisciplinary Integration - Problem Solving Capabilities -Skills building - Cultural Enhancement: quality seems to be a multidimensional variable as viewed by Clark (1983). In most cases though, the quality in teaching and assessment has a focus on absolute numbers, for example, the number of students with work after studies, amount of salary after the completion of a course and average assessment rate of a professor by the students. There are many aspects of quality that should be integrated somehow in the daily practices. For example, quality should promote collaboration, interdisciplinary integrations, is for sure related to processes and workflow management (Donnelly, 2010). It is a matter of Human Entities and Processes Integrations. It also implies an intrinsic motivation since it requires the engagement and the involvement of various stakeholders beyond the specification of its elements. Quality of teaching and assessment should integrate content quality, collaboration aspects, problem solving capabilities, plus a focus on the impact of education. Quality should promote skills building and culture enhancement, and not only a focus on content delivery. It is also important to facilitate the realization of quality elements with the use of technology-enabled processes and components (Donnelly, 2010).

7. A learning analytics framework for perceptions of quality in higher education and a preliminary model of quality perceptions

The synthesis of the previous perceptions provides interesting insights. A first interpretation of the commentary aspect for quality perceptions is provided in the proposed model in Figure 3 below. In fact, a three-dimensional value integration space for quality value components is well defined and is linked with the critical theoretical model which was presented in a previous work (Varouchas and Sicilia, 2017). The value integration space include three dimensions and 20 value components as can be found in Figure 3. This is the point of departure for the rest of the research reported in this PhD dissertation.

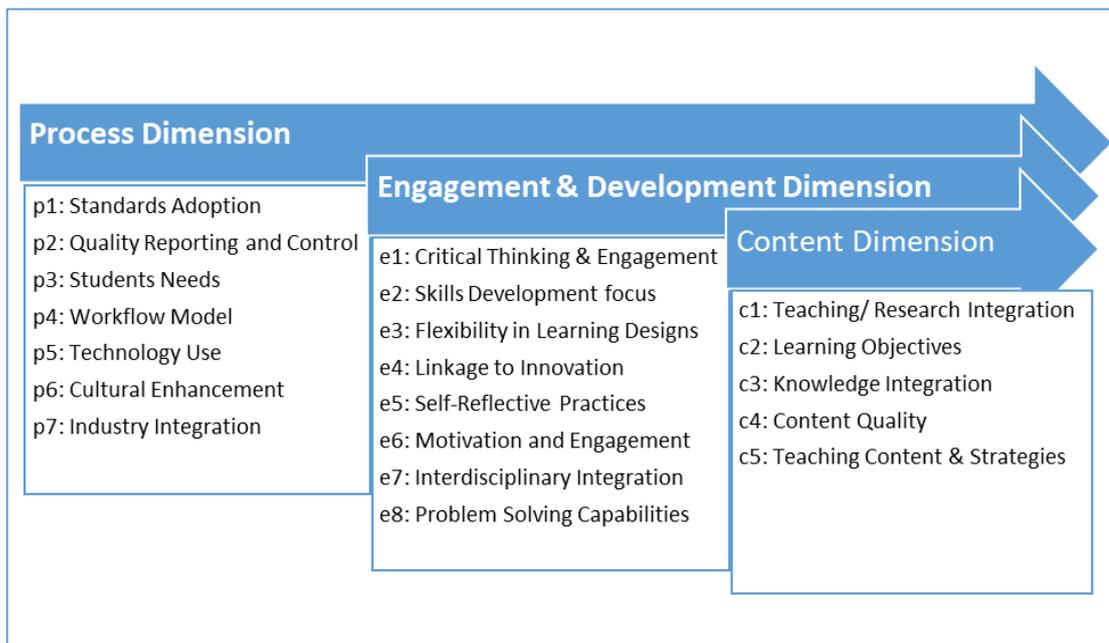


Figure 3. A methodological framework for quality perceptions in higher education (Varouchas & Sicilia, 2017)

The various quality aspects / factors / value components have been mapped against three conceptual dimensions: the process dimension, the engagement dimension and the content dimension, and later parameterized to facilitate to run various data analytics

tests and extract useful insights as described in Table 2 below (Varouchas, Sicilia, Sánchez-Alonso, 2018a).

	Questions	Components	Parameters
Factors (1-16)	Q1: Adoption of teaching practices for achieving learning objectives is a key concern in my teaching content development approach	c1	c.prac
	Q2: Integration of multiple knowledge resources is a key concern in my teaching content development approach	c3	c.reso
	Q3: I typically integrate research outcomes and contributions to the modules/courses I teach	c2	c.rese
	Q4: I use references and material of superior quality for the preparation of my lectures and teaching notes	c4	c.ref
	Q5: I systematically adopt international academic standards for the binding of the modules/courses I teach	p1	p.stds
	Q6: Students' learning needs is a critical factor for formulating my teaching strategy	p3	p.needs
	Q7: I apply a workflow with clearly defined stages for the preparation of my teaching content	p4	p.workf
	Q8: I integrate industry requirements and required skills in the process of delivering content	p7	p.ind
	Q9: Technology in terms of software and applications or services adds value to my quality approach in delivering content	p5	p.tech
	Q10: The teaching and learning context should be customizable and flexible according to students' needs	e3	e.flex
	Q11: Students' engagement in learning and the promotion of critical thinking add value to my teaching strategy	e1	e.engag
	Q12: Cultivating innovative thinking is a key learning objective in my teaching approach	e4	e.innov
	Q13: Teaching should be tightly associated with skills' and competencies' building	e2	e.skills
	Q14: The multidisciplinary approach to teaching is critical for student learning	e7	e.multid
	Q15: Students' motivation should be developed through innovative teaching practices	e6a	e.pract
	Q16: Increased students' engagement in learning leads to increased skills development	e6b	e.innovt

Quality integration (17-22)	Q17: Professors/teaching staff are the key stakeholders for the implementation of quality in Higher Education	p1	i.stake
	Q18: Academic Administration has the role to build a culture of quality assurance in Higher Education	p1	i.cult
	Q19: Lack of resources is a key limitation factor for quality in Higher Education	p1	i.lack
	Q20: There is a gap in the understanding of quality dimensions between professors and students	p2	i.gap
	Q21: Assessing quality in Higher Education requires specification of certain metrics	p2	i.metrics
	Q22: When present, quality in Higher Education enhances students' evaluation of academic programs	p1	i.qual

Table 2: Quality components parametrization mapping

8. Quantitative analysis and results

8.1 Assessment of the instrument

As described earlier in section 4 and specifically in step 5 of the methodological approach, the questionnaire designed and used for the collection of responses attempts to measure different aspects of the perception of quality in higher education - particularly the content, process and engagement. Variables were coded with the prefixes “c.”, “p.” and “r.” accordingly, to ease their association with the main dimensions identified in the review of the literature about the topic. The questionnaire also contained several demographic items characterizing the respondents, that are prefixed with “d.”, and finally, the items in the questionnaire that are related to integration of the other variables are prefixed by “i.”.

In this section, the reliability of the questionnaire administered is assessed and analyze potential differences among groups of participants. The main aim is getting insights on the quality of the instrument and the relation among the dimensions identified. The analysis was done using the R statistical language. The specific R language packages installed and used are mentioned in the rest of the section when appropriate.

8.2 Correlation analysis

All questionnaire items across the three dimensions (content, process, and engagement and development) had medians of 4 or 5 on a five-point scale. This fact points out to an overall agreement on the opinions that all the items are important to the central construct of quality.

The detailed research design that was presented in the previous section, has supported that the correlations between the items in each of the dimensions and among dimensions are all moderate to strong (in the range of 0.25 to 0.5). Pearson correlations show moderate correlation of variables in each dimension, along with regression lines with

positive slope. This is also the case when finding correlations of quality integration items with the rest of the items, with the exception of Learning objectives (c.rese) and quality integration gap between professors and students (i.gap) that are very slightly negative. That particular item together with the lack of resources as a key limitation factor for quality in higher education (i.lack) are the less positively correlated. In the second case, the wording of the item is referring to funding, which may be considered as controversial as related to quality, so this item deserves separate attention. In the former, there is convergence of views of quality between students and instructors - a controversial issue. However, quality integration items do not represent facets of the quality construct, so high correlation was not expected.

Regarding Internal Reliability, Cronbach's alpha measures are respectively 0.73, 0.73 and 0.84 for each of the content, process and engagement dimensions, which can be considered acceptable values. McDonald's omega values, providing an estimation without some of Cronbach's alpha assumptions are respectively 0.78, 0.8 and 0.89. These values are better estimations when attempting to measure several constructs, which may be the case with the three dimensions. When taking together all the items of the three dimensions, Cronbach's alpha is 0.9, showing a good internal consistency for the questionnaire. This indication of good consistency will be later detailed evaluating the extent to which there are different dimensions or a single unidimensional construct, using factorial analysis.

Regarding validity, face and content validity was addressed by the study of the literature and the qualitative part of the study. Here the focus is first on convergent and discriminant validity, i.e. the convergence of items towards the same construct, and the differentiation of items across dimensions. Then, concurrent validity is addressed, in this case, for differentiating respondents that are known to be different demographically.

8.3 Factor Analysis

The detailed research design presented in the section, has supported that there are significant links between quality variables. The exploratory factor analysis for each dimension was conducted using the R statistical language with the “psych” package installed. The first step was that of testing for the number of factors in data. Using parallel analysis (fa.parallel) the suggested number of factors is three in a single component (see Figure 4 below).

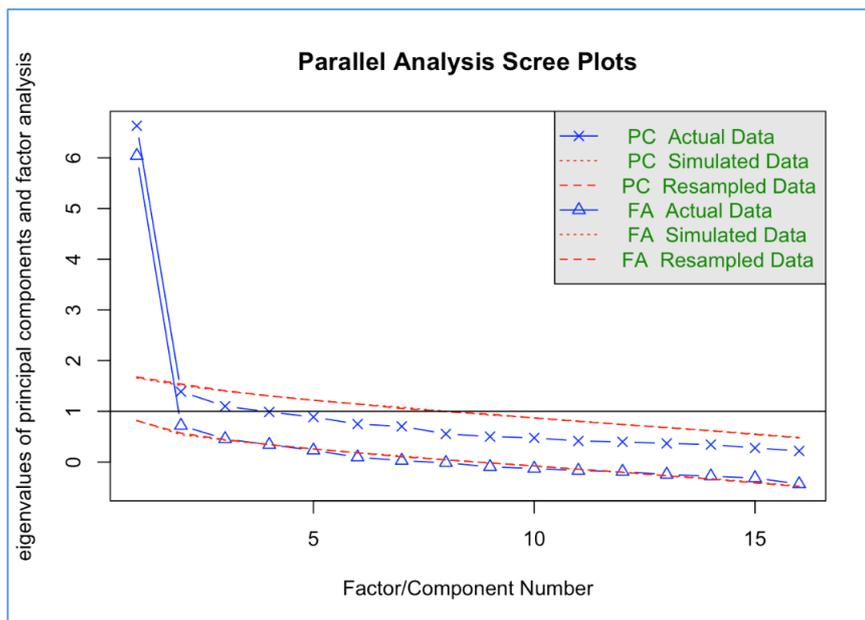


Figure 4. Output of parallel analysis for the quality items

However, finding the number of factors using the Very Simple Structure (vss) inventory of criteria, suggests a smaller number of factors, namely one or two. Using Principal Component Analysis (PCA) to find a descriptive model of the data, it was observed that differences exist between the first component and the rest, as evidenced in Figure 5 below.

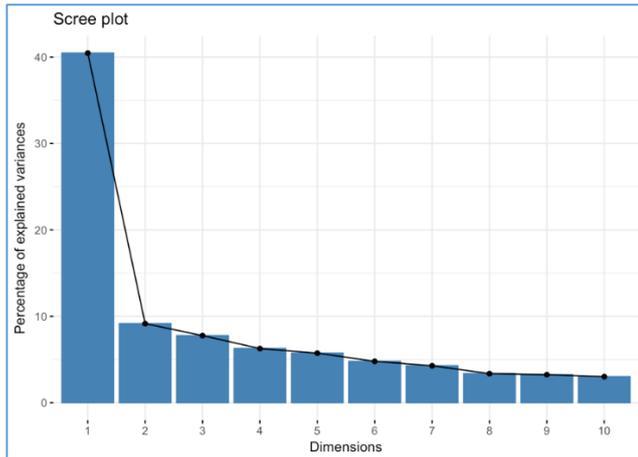


Figure 5. PCA results for the survey items

Observing the contributions of variables to the first dimension of the PCA does not provide insights on a structure that can be related to the three dimensions of the study, so that it is not clear from the analysis done if the three study dimensions are not affected by some other latent variables that can be considered as the main components of quality.

Figure 6 below, shows the path diagram for factorial analysis using weighted least squares for three components.

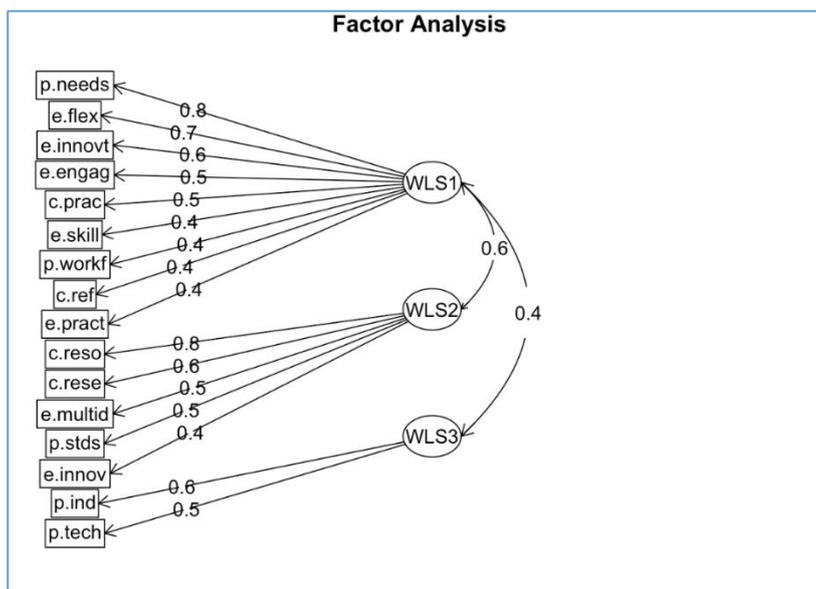


Figure 6. Factor Analysis for three components.

As can be seen in Figure 6, there are significant links of the latent variables to some of the observed ones that do not match the theoretical grouping of items in the questionnaire. This points out to a need for a more detailed analysis of the variables and how staff perceive the relationships among them.

8.4 Discussion of divergences in perceptions among respondent groups

The respondents of the survey can be considered as coming from different groups that may have heterogeneous appreciations of educational quality, and this is an important element to be evaluated. This requires careful examination of the possible differences among groups to detect potential divergences that may inform theory, challenge the notion of a single perception of quality, or suggest limitations of the research carried out given that the sample does not cover exhaustively different demographic groups.

ANOVA was computed systematically for each item and each demographic group to test for differences in the mean for each of the items. Table 3 below, summarizes the results of the analysis.

Groups	Items with differences (significance level in parenthesis)
External versus internal	c.prac (0.05), c.reso (0.05), p.stds (0.05), p.needs (0.0005), p.workf (0.05), p.ind (0.05), p.tech (0.05), e.engag (0.05), e.pract (0.01)
Director role	e.innov (0.05)
Type of contract	c.reso (0.01), e.skill (0.05)
Field of study	p.needs (0.05), e.engag (0.05)

Table 3. Results of ANOVA modeling for different demographic groups.

Significant differences between external versus internal respondents were found in the three dimensions, the most significant being p.needs and e.pract. The first refers to the importance of accounting for student needs in the design of the teaching strategy, and external respondents seem to relate this to a lower extent with quality. This may be

hypothesized to point out to a potential difference motivated by institutions that are more curriculum-oriented or more learner-oriented. In the second case, the relation of innovative practice and student motivation is also different, but it is difficult to speculate about the reasons.

In any case, the differences in all dimensions point out to the need for more research that considers different institutional profiles. This may reveal cultural aspects that might be national, regional or institution specific. The results do not appear to indicate that the dimensions are in conflict but just different weighting of some of the detailed aspects. Interestingly, there are no differences in the items regarding quality integration. It should be noted that in spite of a degree of internationalization in higher education (Altbach & Knight, 2017) the regulation and organization of educational systems is not homogeneous, and this should be taken into account.

For teaching staff with administrative roles as contrasted with the others, significant differences were only found for e.innov. This difference in the weighting of innovative thinking for teaching may be attributed to seniority or background of teaching staff with an administrative role, but in any case, it does not appear to be an important divergence.

Finally, in the case of type of contract, significant differences were found for c.reso and e.skill. It is again difficult to hypothesize why these may be differently perceived depending on the type of contract of the respondent, which can be an important dimension, as it might be that temporary versus permanent, or different levels in work positions may entail different understandings of quality as an organizational process. Figure 7 below shows the distribution of responses from different groups of respondents and an associated distribution estimation, but no clearly interpretable pattern has been found.

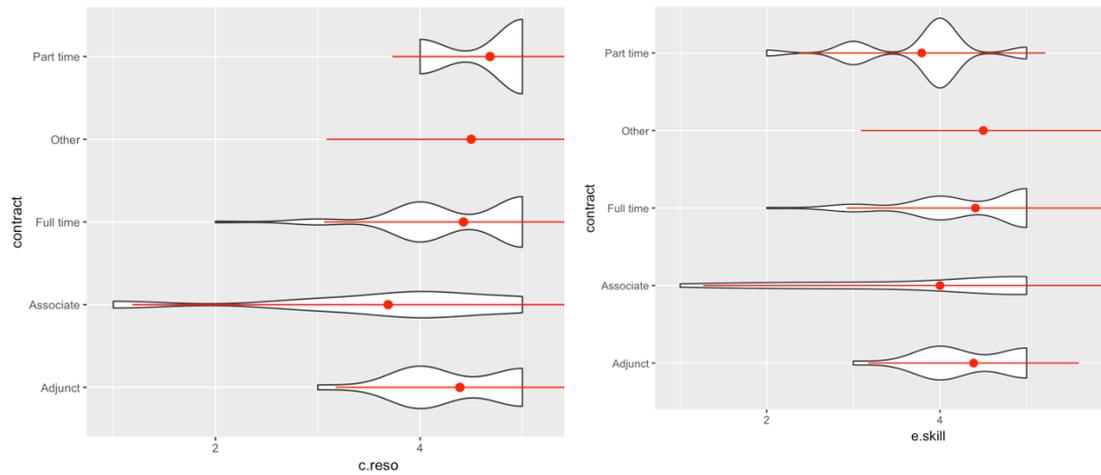


Figure 7. Distributions of responses for c.reso and e.skill by respondents' type of contract.

Considering field of study, differences appear again in p.needs and e.engag. The former may be again a different perception between curriculum or learner-oriented fields. The differences in critical thinking importance may also be hypothesized to come from diversity in subject matters, but the sample is not broad enough across fields of study to come up with a clear interpretation that may differentiate among disciplines in regard to what is high quality education.

9. Qualitative analysis of academics' perceptions on quality in higher education shaping key performance indicators

9.1. Introduction

The University is no longer a quiet place to teach and do scholarly work at a measured pace and contemplate the universe as in centuries past. Nowadays, the university is a complex, demanding, competitive business requiring large-scale ongoing investment (Skilbeck, 2001). Higher education today is challenged by global unrest, regulatory compliance, technology disruption, emphasis on admissions, societal demand for better education and the fact that students are rewriting the rules - a factor academics and administrators usually underestimate. To be able to respond to these challenges, HEIs need to adapt quickly and change what they have been doing in an unexceptional way, capitalize on what they do excellently and make quality a necessary ingredient of their core competency: the curricula. To achieve this, academics need to view quality as a means of continuous improvement and realize that curricula are continuously evolving living structures. In other words, quality should be considered as the pivotal instrument for the transformation of HEIs.

Due to the increase in societal demand for higher education, the needs for diverse skills required in the context of globalization (exploratory skills, exploitation skills, management skills, moral and ethical skills, etc.), and the processes of internationalization and diversification in higher education, a growing concern has emerged regarding the quality of higher education inputs, processes and outcomes (Sanyal and Martin 2007) - the concern to define simple, measurable quality indicators. At the same time the negative effects of heavy reliance on control by such indicators have been highlighted (Aas et al. 2009).

Considering the above points, the research was mainly focused on Steps 3 and 6 of the research model presented in section 4, Figure 2, and the second round was performed. The main purpose of this qualitative research was following the construction of the

theoretical framework and the contribution on an integrated model of quality in higher education, to understand some metrics or key performance indicators for the main dimensions of the tested model. In section 9.2, the key findings of this qualitative analysis will be presented.

9.2 Qualitative analysis results and discussion

The detailed research design that presented in the previous section has supported the collection of significant number of qualitative data by higher education administrators. In this section, the qualitative analysis of the data collected has a threefold objective:

- First, to analyze the basic perceptions of higher education administrators and professors in terms of the complementary value components of quality. The objective is that the integration of their complementary aspects will enlighten a detailed mapping of quality metrics.
- Second, to reveal several concerns and limitations as perceived by administrators and professors related to the integration of the quality value components to the design of learning content and academic programs.
- Third, to emphasize on the understanding of hidden or existing relationships between quality perceptions and performance indicators from different perspectives. Thus, the next methodological step will lead to the clarification of several qualitative key performance indicators.

Several value components are revealed, and their interpretation can guide the justification of various initiatives in higher education organizations.

Having developed the key contribution summarized in Figure 3 - A Methodological Framework for Quality Perceptions in Higher Education - the next thread of the qualitative research strategy was required to elaborate and confirm several quality measurements. For this reason, a second round of focused structured interviews with key stakeholders (academic deans and department heads) were conducted. As mentioned in the introduction, the main purpose of this qualitative research was to

understand some metrics or key performance indicators for the main dimensions of the tested model.

Once more, the Constant Comparison Method was used for analyzing the qualitative data gathered from thirteen interviews with academic administrators and professors in higher education. Following analysis and codification of a detailed research agenda, a summary of the main findings which include constructive responses for the formulation of constructs and candidate KPIs is presented below.

Construct 1: Time for Preparation of Courses / Effort invested in Design

Question 1: How much effort do you place in the preparation to teach a required course in your discipline? Do you believe that the time you invest in the preparation of content is a key ingredient of quality? Elaborate on this statement.

Construct #1 Summary of Findings
The amount of effort will depend on whether the course is new or revised.
I tend to spend quite some time ahead the beginning of a course. I do spend time to update my notes and be informed in terms of latest scholarship in courses. I believe that the time spent to prepare myself, especially where Level 5 and Level 6 courses are concerned, is a fundamental ingredient of quality.
Preparation is a key component of teaching quality.
To teach a course effectively, one would need over 3 hours of preparation per credit hour per week; in addition to this, a faculty member needs to be constantly informing oneself on developments in their field of expertise, which adds significantly to the minimum preparation time cited above.
The time devoted depends on the academic level of the course and on how often this course is taught.

Preparation of the content is a key quality factor in teaching for two main reasons: for addressing learning objectives and outcomes and for making the course interesting to students

Time invested in preparation is a key ingredient in structuring teaching and assessment strategy for a course since it saves significant amount of time when the time comes to update and improve it.

Preparation is key to the success of a course and takes a considerable amount of time and effort.

It depends on whether the course will be offered for the first time and/or whether I deliver this course for the first time.

I do agree that investment in the preparation of the course is necessary and a key ingredient of quality as materials, cases, examples, etc. require constant updating.

I most certainly believe that the time invested in the course preparation is essential for quality.

The preparation of a course, as well as the revision of already existing courses is a time-consuming process. It requires keeping your self-updated in the specialized area of your discipline, both in terms of in theoretical and research-related developments, a careful selection of readings to be assigned as required and optional materials for students to study.

I would guess that It would take me between 25 to 35 hours to teach a required course in economics or finance. This time differs for the introductory classes, which I have taught for decades and are easier for me to prepare, while upper level classes typically require more time. Yes, I certainly do believe that the time spent is an indicator of quality.

Main Finding: It is evident that time devoted for preparing a course is critical as well as the time devoted to update material and to engage students with learning content and context. One generic KPI is recommended:

Preparation Time = Developments of the Field + Frequency of taught+ Motivation Time + Engagement Scenario + Core Knowledge

Construct 2: Technology Enhanced Learning utilization

Question 2: Which are the main technologies you deploy in your classroom? Can you elaborate on the added value contribution of the use of Information & Communication Technologies (ICTs) in your classes? For example, what do you think about the use of educational videos from YouTube? Are there any prerequisite factors for the use of the technology in the classroom?

Construct #2 Summary of Findings
I use slides and videos on company cases in every lecture I also use a simulation game. I do not use educational/instruction videos from YouTube, because they rarely fit the learning outcomes of my class.
I mainly use PowerPoint presentations as a point of reference. In the learning process, ICTs can be useful.
Very rarely videos are used, and especially when I am not well prepared. Students don't study as hard as they should, so I consider any extra material as time consuming purposeless.
I use Blackboard in my teaching almost daily, which includes PPT, maps, online articles, but also YouTube videos, which I screen for academic content and validity. The latter is a prerequisite for the use of online resources in my courses.
I mainly use Blackboard CMS and online articles, videos and online financial information.
Moodle provides the basis for most of my modules. Material is posted in advance of a class and will include follow-up activities for students to engage with. I do use videos from YouTube (and other internet resources), but always in the context of a slide set (PowerPoint), explaining the background to the video content. It is important that the taught content of the video is placed properly in the context of the LOs and assessment units I have designed. I have also experimented with 'clicker' technology (Bojinova et al, 2013) in larger lectures - to get some instant feedback from the students on the degree to which an important element of a course has been understood.

I use blackboard (e.g. blogs), clickers, I show educational videos (short and long), PowerPoint - generally not too advanced technology. On its own technology is not sufficient; it must support the instructional approach and fit the material presented. For example, I use clickers 3-4 times in a specific course to stimulate interaction with students and engage them in the course material. But not all material may be appropriate for the use of clickers and one also needs to be careful with overdoing it. I also use educational videos. Short videos from YouTube are useful to illustrate some examples or issues discussed in class. I also use longer videos in which case we accompany the video with a structured 'interactive exercise', i.e. students receive the exercise in advance which includes questions on the video. When watching students must take notes to answer the questions; extensive discussion follows. Again, just showing the video is simply entertainment, not learning. I would say that a prerequisite factor is that technology is a means to an end, not an end in itself (in non-technology classes at least). Technology must support learning and the instructional methods employed each time. They also must not distract from learning.

I use extensively ICT tools. From university links to student study guide supplements, to videos, animations, YouTube, smart phones online quizzes, etc.

I use Blackboard and in some of my classes make extensive use of various Blackboard tools (i.e journals, blogs, and discussion forum). These tools contribute to making the class more interactive and facilitate exchanges both between the instructors and among students. They also allow for class discussions to be extended online, facilitate the supervision of projects (work in progress), peer review, coordination of group assignments between students. As far as teaching is concerned, I use ppts in which I frequently embed audio-visuales, stills links to interesting articles or research findings, as well as educational videos. The use of ICTs is essential for today's teaching environment: It can be used to illustrate in a student- friendly way elaborate ideas or concepts; promotes a more interactive approach to teaching and learning; can facilitate class discussions; is compatible with the habits of the generation of "digital natives" and our culture's emphasis on the visual.

ICTs are important tools in teaching and learning. We live in the era of information technology; learning may be facilitated using different ICTs such as educational videos, animations, online exercises/quizzes and web resources available through Blackboard. As there are different types of learners, some students may benefit from ICTs, e.g. educational videos and animations may help some students visualize concepts and information or may provide real-life examples. Prerequisite factors for using technology: instructor training; availability of time from the part of the instructor to "try" new technologies; institutional support in form of equipment, resources and assisting staff; and ideally, also course release for innovation in teaching.

The main technologies that I use are: Blackboard/Canvas; Excel and video content from sources like Khan Academy, YouTube, TED talks and Merlot. Current media such as CNN, CNBC etc. are also used. I believe in a field that is as time sensitive as economics & finance that these sources are invaluable in keeping students informed and educated. One of the best aspects of teaching these subjects is that students can be on the frontiers very early in their education, which lends interest and authenticity. In terms of prerequisites for tech use there is some: the rooms must be tech infused and the internet connection should be high speed and high quality. Faculty might need some training but generally, students are savvy enough to use the technology.

Main Finding: It is evident in the responses that technology enhanced learning solutions are perceived as key quality drivers in higher education. There is a variety of approaches and technologies available. One generic KPI is recommended:

Technology Infusion = (Blended + CMS) / Traditional

Construct 3: Academia – Industry Partnerships

Question 3: To which extent do you use industry project engagements in your classes?
Can you name some transferable skills acquired by students through these engagements?

Construct #3 Summary of Findings
All my courses have an industry project. Students develop team working skills, presentation skills, interpersonal communication skills, problem solving skills, time management skills.
I would mostly think of cases or small videos for students to develop moral awareness, applicability of knowledge and management of possible solutions.
My aim is to use in all my courses live assignments, but I try also to maintain the relevant equilibrium in the themes of the assignment, and the topics. Transferable skills could be professionalism, teamwork, and leadership
Numerical skills, Microsoft Office skills, Analytical skills
Industry project engagements provide students with practical problem-solving skills; realistic development goals; customer-facing skills; project management, planning and reporting skills.
Use of 'live assessments', an export business plan Executives from the company deliver the project brief to students, deliver company presentations, provide support to student teams and they attend the final student presentations. Transferrable skills are built through these projects in varying degrees: communication skills, reporting skills, presentation skills and teamwork skills, leadership, time management, negotiation
Students come in to contact with organizational environments of different sorts (civil society organizations, NGOs) through course assessments (mostly in advanced courses) to do participant observation and interviews in such settings. Students of an IHP course are required to do at least 15 hours of service work in an organization that caters to the needs of refugees.

Main Finding: It is evident that most respondents recognize the need to align their course with industry requirements and real-world problems. Thus, a critical component in the proposed KPIs is related to Industry Orientation and Alignment. Two generic KPIs are recommended:

- **Industry Alignment** = Number of Case Study Analyses per course x Time allocated per analysis / Total Course Teaching Hours in an academic term.
- **Interaction with Practitioners** = Number of Interactions per course per academic term

Construct 4: Students' Research Outcome and Quality

Question 4: Do you have any criteria for measuring the quality of the research work of your students? Are you interested in measuring the dissemination of their work? For example, how many research papers are published from students' coursework?

Construct #4 Summary of Findings
We mainly use the rubrics for essay assessment as designed in our program. The criteria are well-defined in terms of knowledge/understanding, methodology, argumentation and critical analysis skills, presentation and essay readability. Yes, I would be interested in measuring the dissemination of students' work. I am currently looking for the relevant student journals that they could use to publish very good papers from their coursework.
I do not have any criteria measuring the quality of my students' research work.
Yes, assessment of research projects is based on an established set of criteria. We have no examples of published student projects, even though some of them are of high quality.
At an undergraduate level, the effort for students is to build their research skills and theoretical foundations. Publications is not a priority for me.
I strongly assess the method and the structure of the paper, as well as the selection of the most adequate journal

<p>My students have not published any research papers. I would not consider this a realistic goal for undergraduate students.</p>
<p>Not beyond the rubric which is used to assess the quality of produced research work. (e.g. originality, academic relevance, literature review, field research and methodology, etc.)</p>
<p>Few research papers are published by students apart from student symposium publications.</p>
<p>The criteria are reflected in the rubrics/marketing schemes</p> <p>Important criteria are appropriate use of suggested research methodology quality and appropriate use of sources of sources (updated bibliography, classic works, relevance to the specific topic, referencing/citations), concept use (terminology) and concept development, sociological relevance, application of theory, connection of research finding to relevant bibliography, organization and focus of the paper, development and clarity of argument, use of language and technical issues.</p>
<p>We have a rubric that we use to evaluate students' research work. I would be interested in measuring the dissemination of their work, although I am not doing it yet on a systematic basis, because we have a small number of students and few have produced projects that would be worth publishing.</p>
<p>We encourage lots of faculty/student research and at our annual Research Days event this past April the College had 102 such projects. We are very interested in wider dissemination of student research and encourage them to pursue publication should the quality warrant that approach.</p>
<p>My current classes focus on theory and practice, not research. Thesis projects are frequently presented at conferences.</p>

Main Finding: It is evident that most respondents recognize that student research works improve the quality perceptions of course and its impact. Thus, a critical component in the proposed KPIs is related to Research Works and Depth. Two generic KPIs are recommended:

- **Research Works** = Number of student research works delivered per academic program
- **Research Work Depth** = Number of student works published in peer reviewed conferences

Construct 5: Engagement

Question 5: Do you promote discussion on a given topic among students in your classroom? Are you interested in the generation of new ideas on the topic discussed coming from students? How do you balance critical thinking and knowledge transfer in your lectures? Any good recommendation, for example, 50% knowledge transfer and 50% critical thinking?

Construct #5 Summary of Findings
<p>My classes are interactive and promote discussion of questions and cases. My preference would be for 30% theory and 70% critical thinking/problem solving; but this requires that students have done the pre-reading.</p>
<p>I try to promote discussion on a given topic, especially in courses where cases are used or when the interpretation of primary texts is involved. It is difficult to balance critical thinking and knowledge on 50%-50% basis, but given the nature of our discipline, that is, philosophy, and the relevant courses, it is fundamental to combine both these two components. I try at least to have at a 40% (critical thinking) and knowledge (60%).</p>
<p>I also engage students on discussions both teaching topic and non-teaching topic related. Critical thinking is essential for my classes otherwise, students lack a lot of information, and they are left behind in terms of knowledge if they do not engage in critical thinking activities. I think there is no rule about balancing critical thinking and knowledge transfer, everything depends on the cohort, and that is the golden rule for me.</p>

<p>I offer students just enough content and context to allow them to work critically with the texts; I teach on the assumption that they have covered the reading for the day and my role is to facilitate their understanding.</p>
<p>Elaborating business cases serves the purpose of in-class discussion and exchange of ideas. In order critically to be gained students should have grasped theory as well as alternative interpretative frameworks. Thus, balancing knowledge and critical thinking is not a task easily accomplished.</p>
<p>Discussion is encouraged in class, but mainly to identify misunderstanding and to share best practice. New ideas are unlikely to be uncovered in my classes - but where the discussion leads outside of the LOs, students are notified, but encouraged to read beyond the intended outcomes.</p>
<p>In most lectures, I facilitate discussion and active student engagement. I guide students to come up themselves with the important concepts they would have to learn and to critically evaluate them.</p>
<p>By presenting some material and asking questions or by addressing questions to students and guiding a discussion before the introduction of a new topic. I use educational videos as the starting point of a discussion or alternatively a case study, a graph some visual asking students to interpret and elaborate on the relevant topic. I ask students to contribute as I am presenting new material, to express their views, share experiences, and provide illustrations. Allocating about 1/3 of class time to class discussion should be appropriate.</p>
<p>I use group discussion in my teaching, I am interested in the generation of new ideas coming from students. I try to not only transfer knowledge but also to use active learning methods such as projects and literature discussions that cultivate critical thinking. I believe the level of the course plays a significant role, and thus 50-60% knowledge transfer and 40-50% critical thinking would be appropriate for introductory courses. In higher-level courses, the proportion should shift towards critical thinking, synthesis and analysis, and less towards knowledge transfer.</p>

I do promote discussion topics often starting a class session on a direct question that I want students to address. In teaching, I am not too concerned with new idea generation as opposed to critical thinking on the topic. I value critical thinking almost above all else, it is a very important skill to develop.

I make no overt effort to balance these two, but I do recognize that at the lower level, simple knowledge acquisition is important; students do need to have a set body of knowledge about economics and finance.

Main Finding: It is evident that most respondents recognize that engagement of students in interactive discussions promote the quality and the impact of teaching and learning. Most respondents replied that balancing knowledge and critical thinking is not a task easily accomplished. For this reason, no KPI is proposed about balancing those two parameters. Nevertheless, a critical component in the proposed KPIs is related to Engagement. One generic KPIs recommended:

- **Engagement** = Documented Discussions / Total Number of 50-minute lectures per course

Construct 6: Competencies and Skills

Question 6: Do you constantly associate learning objectives to transferable skills? Do you assign a specific number of teaching assignments to students? Can you give an example stating key elements in such an assignment? For example, in order to promote critical thinking, I design the X assignment.

Construct #6 Summary of Findings
In my courses, a cognitive skill in relation to problem solving is assessed through case study analysis. Students need to analyze and solve a real case, using the Harvard case study methodology.
I do not design assignment for critical thinking, I prefer the in-classroom practice both in writing and orally.

<p>In my field that is English, learning outcomes are directly related to transferable skills.</p> <p>All assignments require that students exercise their critical thinking skills by unpacking layers of meaning in various types of texts.</p>
<p>Research projects are typically connected to specific learning outcomes in my courses.</p> <p>My courses have one project, (plus an exam and a group or individual presentation).</p>
<p>It is my practice to design in-class assignments to meet learning outcomes.</p> <p>Learning outcomes are directly related to skills acquisition.</p>
<p>In my technology introductory course, students are assigned the development of a video which they share with their classmates through Blackboard. Then, based on a rubric I give them, they evaluate and rate their classmates' videos.</p>

Main Finding: Most respondents recognize that practical and transferable skills as well as skills and competencies promote the quality and impact of teaching and learning. Thus, a critical component in the proposed KPI is related to Engagement. One generic KPI is recommended:

$$\textit{Skillset} = \text{Number of Intended Skills per Course} / \text{Average Class Grade per Course}$$

Construct 7: Inter/Multi-disciplinary Character

Question 8: What about the interdisciplinary character in the courses you teach? Can you name how many contributions from different disciplines you utilize in teaching your courses? For example, in the X course I teach, I use main contributions from four disciplines: Computer Science, Sociology, Psychology and News Media.

Construct #7 Summary of Findings
I use theories from marketing, communication and psychology
I try to provide a more interdisciplinary assessment in almost all courses.
My discipline is interdisciplinary by default. I use History, Sociology, Psychology
In all courses I teach, I combine Literature, History, and Culture Studies.
In the course on Poverty, I use Sociology, Economics, Law, Environmental Science, Behavioral, Politics and Computer science.
Many of my courses involve Computer Science and Business. I also teach a course on Communication Theory, which mixes Communication, Psychology and Business Organization.
The introductory course in international business relies on Sociology, Political Science, Law, Economics, Ethics/Philosophy.
Biology, Chemistry, Physics, Social Sciences, Computer Science, Philosophy are the main disciplines that contribute to the teaching of all my courses.
In my migration and refugee courses (Migration in the Global Age and the IHP course Private Stories, Public Stories in Social and Historical Perspective), besides sociology, economics, anthropology, law (for policy related issues), news/media, history (oral history).
The field I teach is interdisciplinary by its nature. We use concepts from different disciplines and emphasize the importance of economic, social and ecological dimensions of environmental issues. I try to present as many perspectives as possible so that students make connections with their disciplines. I ask students to reflect on how each discipline could help study a problem and help towards its solution. Information technology, math, different branches of natural sciences, social sciences

(sociology, economics), law, ethics, policy making are some of the disciplines that are involved in the study of the topics I present.

We live our lives in an interdisciplinary, multicultural and global fashion and our students should be educated like that to be successful citizens and employees. All my classes have content from Politics, Geopolitics and Sociology.

Main Finding: It is evident that most respondents recognize that the multi/interdisciplinary character of a course, promotes the quality and the impact of teaching and learning. Thus, a critical component in the proposed KPIs is related to Inter/Multi-disciplinary Character. One generic KPIs is recommended:

Interdisciplinary Character = Number of Disciplines applied in teaching material in a course.

Construct 8: Metrics

Question 9: If you were asked to write down a formula for the quality in higher education what factors would you include? For example, Quality = Time Allowed for Preparation + Pedagogy + Student Engagement.

Question 10. Name one metric from your own perception for the quality of education in higher education. For example, “Quality Metric #1 = # of Students Passing a Course / # of Total Students Enrolled in this Course” or “Quality Metric #2 = # of Papers Presented in Conferences / # of Papers Delivered in a Course Assessment from Students”.

Main Finding: In response to questions 9, interview participants have suggested different formulas for the measurement of quality (QFs), based on their teaching experience and active involvement in curriculum reviews:

QF #1 = Time Allowed for Preparation + Scholarship/Academic Expertise + Pedagogies + Student Engagement

QF #2= Selected Students + Meaning of Knowledge + Engagement + Dedication

QF #3= Faculty Expertise + Pedagogies + High Academic Standards

QF #4= Planning + Preparation + Personality + Pedagogy + Physical Environment
+ Assessment

Similarly, in response to question 10, the following Quality Metrics (QMs) are suggested by interview participants and are summarized below:

QM #1 = Papers Presented in Conferences

QM #2: Job positions in business students get into 5 years following graduation

QM #3: Successful teaching of transferable skills

QM #4: Synthesis of concepts

QM #5: Ability for independent study

QM #6: Ability to solve problems

QM #7: Ability to collaborate in teams

QM #8: Number and quality of faculty publications

QM #9: Student Satisfaction and Happiness

QM #10: Student Engagement

QM #11: Number of students with high/good performance in course assessments.

In the table below, nine generic KPIs deriving from the research findings are listed.

Generic KPIs
1. Preparation Time = Developments of the Field + Frequency of taught+ Motivation Time + Engagement Scenario + Core Knowledge
2. Technology Infusion = (Blended + CMS) / Traditional
3. Industry Alignment = Number of Case Study Analyses per course x Time allocated per analysis / Total Course Teaching Hours in an academic term
4. Interaction with Practitioners = Number of Interactions per course per academic term
5. Research Works = Number of Research works delivered per Major
6. Research Work Depth = Number of student works published in peer reviewed conferences
7. Engagement = Documented Discussions / Total Number of 50-minute lectures per course
8. Skillset = Number of Intended Skills per Course / Average Class Grade per

Course
9. Interdisciplinary Character = Number of Disciplines involved in teaching material of course

Table 4. Generic KPIs for quality in teaching and learning

In Figure 8 below, the integrative model for the study of quality perceptions in higher education is introduced and together with the nine generic KPIs will provide the basis for future research. These KPIs will be applied to measure quality dimensions and produce quality metrics which will eventually be used by academic administrators and decision makers for quality enhancements leading to sustainability of higher education curricula.

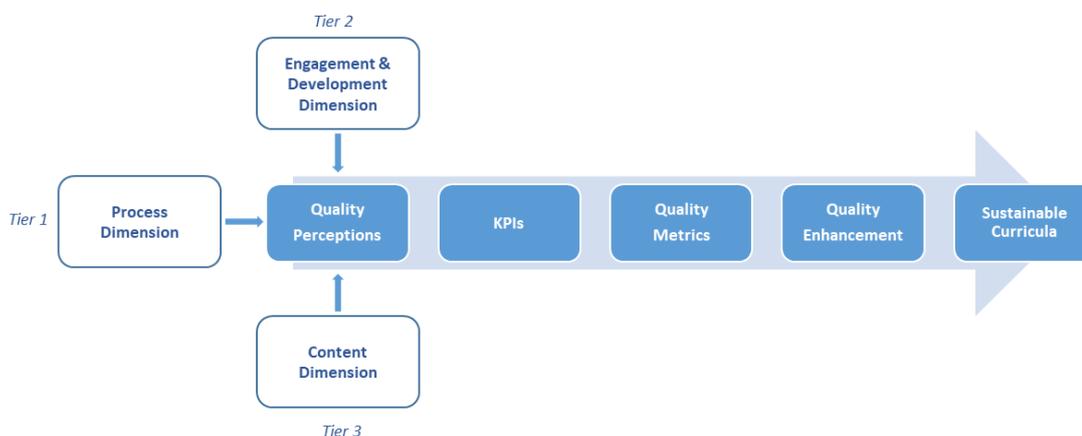


Figure 8. An integrative model for the study of quality perceptions in higher education.

10. Conclusions

In this thesis, the background and the purpose of this research was described. It was of key importance to analyze in depth all the quality factors that affect the overall performance in higher education. Within this context it was also of extremely importance to analyze the perceptions for the quality from the administrators' point of view. This work is promoting a new vision for the design of curricula and programs in higher education and promotes the role of knowledge dissemination technologies as a key success factor.

A model of the components of quality in higher education was proposed based on an extensive collection and consolidation of quality elements found in the literature. The model considers many concrete and specific aspects, complementing previous models that are described in generic categories or aspects (Owlia & Aspinwall, 1996). A questionnaire was devised to validate the framework and gather additional information on the various factors underlying the notion of quality.

Survey results pointed out that all the elements identified are important to the central construct of quality. The detailed research design presented, has supported that the correlations between the items in each of the dimensions and among dimensions are all moderate to strong. Factor analysis indicated that there are significant links of the value components to some of the observed ones that do not match the theoretical grouping of items in the questionnaire in the three distinct components of process, engagement and contents. Therefore, the quality variables could be further re-arranged in groupings to have stronger links and identify independent aspects. Also, the analysis has revealed a clear need for further investigating inter-institution or even national, regional divergences in perceptions of quality across all dimensions, but pointed out to a weaker importance of differences related to the respondents' position.

In any case, the differences in all dimensions point out to the need for further research that considers different institutional profiles, curriculum or learner-oriented, innovative practices and student motivation, diversity in subject matters, and the type of contract

of the respondent. The findings suggest the need of additional inquiry in future work. Concretely, in-depth interviews with higher education administrators and faculty appear as a promising vehicle for advancing in the directions pointed out in the discussion. This would eventually allow for a formulation of Key Performance Indicators (KPIs) based on a deeper understanding of the different independent dimensions of the quality construct.

Despite the common agreement among academics on the importance of quality in higher education, a consensus on its conceptualization has not been reached yet. Quality measurements stemming from KPIs provide the basis for rethinking the curriculum and enhance the pedagogical strategies for developing sustainable higher education programs of study. According to Yarime and Tanaka (2012) point of view, the content and delivery of these programs will reflect interdisciplinary systems thinking, dynamics and analysis for all majors, disciplines and professional degrees - education would have the same lateral rigor across, as the vertical rigor within, the disciplines. A key result included in research findings, is that quality indicators could be encapsulated in KPIs to measure multiple dimensions of quality in higher education. It is in the hands of HEIs to decide when and how to thoughtfully and effectively integrate quality metrics in their systematic quality assurance processes recognizing this to achieve greater efficiency and accountability within their organization (Burke and Minassians, 2001). Additionally, the significance of measuring quality will make faculty – the main actors in quality assurance - realize that they are holding an instrumental and challenging role in the quality assessment process and they are not simply entities having to perform another clerical and time-consuming task.

The findings suggest the need of additional inquiry in future work especially towards two directions. First, the direction of refining and standardizing KPIs and developing a software tool for measuring them. Standardization requires further research in more European universities complying to Bologna Process, have implemented a quality assurance system and offer accredited and/or validated degrees. Second, the direction of applying quality metrics to maintain academic program sustainability. Activities for

sustainability at higher education institutions should involve interdisciplinary cooperation and close collaboration with diverse stakeholders in the society. So, the next immediate step is to draft a plan to continue the work on designing and testing the generic KPIs developed here. According to this plan, testing will be achieved through a pilot testing of the application of proposed KPIs in three undergraduate courses in Greece and Spain within year 2019. In future research, KPIs will be codified in the most appropriate category as shown by the analysis performed and further discussed through in-depth interviews with higher education administrators and faculty to further validate them and consider measuring them. Finally, the metrics produced by the measurement of KPIs will provide the necessary intelligence to decision and policy makers towards enhancing university curricula. The latter will be a key ingredient for ensuring the sustainability of curricula and academic programs of higher education institutions. In support to this view, according to Sterling (2004), sustainability is not just another issue to be added to a curriculum, but rather can be a gateway to a different view of curriculum, pedagogy, organizational change, policy, and ethos.

In summary, the three research objectives stated in Section 2.2, have been adequately met and have produced outcomes which enrich the quality assurance literature and enhances practices in higher education. The analysis of the correlation of objectives to outcomes can be found in the next section (Section 11).

11. Key contributions of the research

This PhD thesis has a three-fold multidimensional contribution to the core body of knowledge of Technology Enhanced Learning, Learning Analytics and Information Systems research.

First, the contribution to the body of Theory of Learning Analytics Research - the deployed scientific research methodology resulted to three key theoretical constructs addressing the three research objectives respectively:

- 1) the first research objective materialized into a Methodological Framework for Quality Perceptions in Education, a multipurpose quality measurement tool based on twenty-two (22) factors of quality (Varouchas and Sicilia, 2017). This is a sound contribution that aims in organizing and strategizing the workflow for quality assurance plans in institutions of higher education. It also serves as an advanced decision-making tool for higher education administrators and consultants. This framework is presented in Figure 3.
- 2) the second objective produced a generic core-extensible set of KPIs consisting of twelve (12) well defined metrics. This second theoretical construct sets the basis for future enhancements and for a new era of advanced multidisciplinary measures for quality in higher education. It is a novel contribution that adds to the body of knowledge in Learning Analytics and Technology Enhanced Learning domains. The second construct is presented in Table 4.
- 3) the third objective has culminated the research by producing an integrative model for the study of quality perceptions in higher education as presented in Figure 8. This model provides the basis for future research in the field of Learning Analytics and sustainability in higher education curricula (Varouchas, Sicilia, Sanchez-Alonso, 2018b).

Additionally, a novel multidisciplinary contribution in the intersection of Information Systems and Behavioral Sciences, related to the unique justification of a perception-based process of added value in KPIs and analytics. This is one more significant contribution that is intended to be published as an output of this PhD thesis.

Second, the contribution to the practice of Learning Analytics Research - the main outcomes and contributions of this study as explained in the previous section, enable various implementations and future research directions that integrate academic research with industry solutions. In section 13, the inspirations regarding future research are presented.

Third, the contribution to higher education Policy Making and Decision Making - the theoretical contributions of this thesis have the following significant implications to advanced decision making in higher education:

- 1) They can support quality assurance initiatives
- 2) They can support an evolving ecosystem of measurable KPIs and analytics permitting a new methodological and applied framework for quality assurance
- 3) They integrate student-centric and faculty-centric perceptions on quality with significant impact on the design of curricula and academic programs.

Finally, the contribution to Methodology - this is one of the few recent studies in Learning Analytics Research that is based on a spiral of qualitative and quantitative research methodology integration. This is the most effective way to approach and study such a phenomenon.

It is important to emphasize that the main contributions of this research have been published, following rigorous blind peer review processes (Varouchas, Sicilia, Sánchez-Alonso, 2018a and 2018b).

12. Limitations of the research conducted

This study has been conducted following high-quality protocols in advanced scientific research. To conduct the interviews complying to ethical standards, approval has been received from the Institutional Review Board (IRB) at Deree-The American College of Greece. For informative purpose, the number assigned to my research protocol is 201805121.

The limitations which have been encountered and tackled with are:

- The complexity of quality assurance systems
- The multidisciplinary character of performing research in higher education and the intensive qualitative nature of the process of quality assurance
- Any effort to measure qualitative attributes through quantitative measures has always a risk involved which is hard to measure beforehand
- Barriers in doing insider research.

Being a professor in higher education teaching information systems and management at Deree-American College of Greece, has given me the opportunity to constructively contribute to the periodic review and improvement of computing curricula, namely Computer Information Systems, Management Information Systems and Information Technology. Furthermore, serving as academic department head, I have initiated and coordinated curricular reviews together with a project on assessing learning outcomes by employing direct and indirect assessment methods. In addition, serving the undergraduate Curriculum Committee as an elected member for several terms, I have coordinated the quality assurance projects aiming at increasing faculty awareness on outcomes assessment and assist fellow department heads in developing and implementing the assessment plan for their departments.

So, holding a demanding, dual role of the researcher and educator, it is encouraging that the experience acquired from various curricular review and assessment projects together with my active involvement in academic committee work, has significantly contributed to the quality of this thesis. Nevertheless, according to Smyth and Holian (2008) “taking up the research role as an ‘insider’ confronts the researcher with many

dilemmas, questions and decisions to weigh up, not the least of which is that it is in addition to their organizational role” (cited in Sikes and Potts, p.33). Since I am conducting research from within the organization I work for, on one hand it is my ethical and professional responsibility to maintain an objective position in the interpretation of the findings and establish a transparent and informed channel of communication with the research participants who happen to be my colleagues. This has been achieved since I am not currently holding a manager’s position having to deal with power and authority issues in my daily interaction with my colleagues who have already accepted me as a coordinator of the quality assurance effort. On the other hand, my knowledge of processes, policies, culture and personalities at Deree, could entail a degree of subjectivity. One example, is summarizing qualitative insights with which I have dealt with maturity and readiness. As Robson (1993) outlines in his view on the advantages of ‘insider’ research “you should have ‘street credibility’ as someone who will understand what the job entails, and what its stresses and strains are. In general, you will already have in your head a great deal of information which it takes an outsider a long time to acquire”.

Therefore, it is profound that my research as an ‘insider’ researcher is what numerous studies have attempted in the past with success; to address a practical problem by making the two positions meet: “objective and subjective points of view can be complementary, as can quantitative and qualitative research methodologies and methods” (Creswell, 2003).

13. Future research directions

The findings and contributions of this research have triggered several challenging research directions for the near future and are grouped into three clusters: those related to further extending the study by overcoming the limitations that are described in the corresponding section (Section 12), those related to direct practical application of the conclusions and research outcomes and future research directions beyond the scope of this study.

As far as future research regarding the first cluster, refining and testing the generic KPIs developed here will be achieved through a pilot testing of the application of proposed KPIs in three undergraduate courses in Greece and Spain within year 2019. This is an opportunity to derive the eleven (11) quality metrics outlined in section 9 of this study. Subsequently, a quality index on the quality of curriculum and its three constituents (teaching, learning and assessment) could be estimated. Additionally, apart from teaching staff and administrators, students will be involved in the study as major stakeholders in education, aiming to fill the gap in research works related to the convergence of students and administrators' perceptions about quality.

The research directions of the second cluster could initiate standardization the KPIs and analytics based on metadata standards and ontologies. Then, continue with the design of cloud-based analytics services for higher education institutions and a software application for measuring the generic set of KPIs produced here utilizing Software as a Service (SaaS) technologies.

The research directions of the third cluster, could point towards integration of the proposed framework with Advanced Machine Learning and Artificial Intelligence algorithms for optimizing performance and quality assurance. Additionally, integration of the key contributions with industry platforms like Tableau and SAS analytics or SAP Hana Analytics for an IT enabled add-on to support decision making of higher education administrators could be implemented. Additionally, the possibility of adding a sustainability perspective in measuring the performance in higher education institutions could be explored.

14. Bibliography

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APPENDIX A - A qualitative interview on scholars' perception about quality in higher education – Round 1

This qualitative interview is part of Emmanouil Varouchas's PhD research. The focus is to acquire understanding of academics' perceptions on the integration of Quality into Higher Education - an elusive, multidimensional concept. Data collected from this survey on various aspects of quality in Higher Education, like, perceptions and approaches in student-centered teaching, learning, assessment and curriculum enhancement, will eventually be integrated in a framework for the next steps of the research.

Respondent's information

Please fill in your information.

Name:

Surname:

Title (Ms, Mrs, Mr, Prof, Dr):

Position at Deree-ACG:

Structured Interview Questionnaire (Round 1)

Please answer all questions. It will not take you more than 45 minutes. Your contribution to this project is valuable.

1. Based on your academic experience, please provide your own perceptions of Quality in Higher Education in relevance to teaching and assessment. Which in your opinion are the necessary elements of quality in teaching and assessment of Level-5 and Level-6 courses?
2. What is the focus of your teaching strategy? Content knowledge transfer? Collaborative Learning? Other? Which are your main concerns about quality when you develop learning content for your Level-5 and Level-6 courses? How do you integrate qualitative features in learning content?
3. Please name two classroom or online teaching practices/activities which according to your opinion promote quality and enhance student learning.

4. Which are your main concerns about quality when you develop assessments for your Level-5 and Level-6 courses? How do you integrate qualitative features in student assessment?
5. Do you consider that student assessment is missing some critical aspects of quality? Based on your perceptions of quality, name and briefly discuss additional assessment criteria which you would like to introduce in Level-5 and Level-6 courses.
6. Are you satisfied with the availability and use of technologies, like Blackboard CMS, in support to your teaching and assessment strategy?
7. Please name necessary elements of quality which must be integrated in teaching and assessment of a Level-5 or Level-6 course (choose any context you wish - Content, Engagement, Learning Strategies, Assessment Strategies, Administrative Policies on Quality Assurance, use of ICTs tools in Higher Education). You may suggest an innovative assessment method or state the most effective one you are currently using.
8. Does knowledge dissemination and sharing among academic departments support the development and enhancement of learner-centric curriculum? Please provide with an example.
9. Please discuss how the quality assurance system in place supports academics in closing the loop among teaching-learning-assessment-curriculum. What are your suggestions in improving the above process?
10. What do you think about the role of quality assurance in achieving quality enhancements? Does compliance to quality assurance eventually elevate the quality of student-centered learning and assessment?

Dear colleague, thank you for taking the time to complete this survey and contribute with your expertise in my research. I truly value the information you have provided.

Prof. Emmanouil Varouchas

Deree-The American College of Greece

Qualitative Survey Results –Round 1

Q1-Answer 1: I am not sure if the perspective here is institutional or individual (i.e. faculty). At the institutional level it is important to ensure that faculty engaged in teaching have the appropriate qualifications (e.g. PhD in related areas, research, etc.) and demeanor. At the individual faculty level, it is important to inform teaching with research and to approach the course from an academic perspective as opposed to a practical one. Instructional and assessment methods need to support/assess the course LOs and the latter must be aligned with the level. Throughout the course must be oriented towards imparting critical thinking skills (in addition to domain knowledge of course). A critical element of quality in all the above are 'checks and balances' throughout teaching and assessment. Indicative examples are second marking, Board of Examiners, External Examiner, course evaluations, faculty evaluations, etc. I also consider reporting an indispensable part of quality assurance as it forces reflection and action for improvement.

Q1-Answer 2: Contents should be updated and take into consideration the academic specialties of the students. Focused on skills development Professionals to each degree or professional field. At the same time the subject should be connected to the research or professional expertise of the teacher, if possible. Moreover, interactive and collaborative teaching should be boosted

Q1-Answer 3: Quality of teaching and learning heavily depends on suitability of proposed courses to students' needs / characteristics e.g. learning styles. This means that all Units of Learning should be composed of the components (learning objects / content, learning activities and learning environment) that are the most suitable to students' needs

Q1-Answer 4: "To me, Level-5 and Level-6 courses are advanced courses. High level concepts with the aid of conceptual diagrams and flow charts should be taught. Also, the courses should avoid tedious and background knowledge.

Q1-Answer 5: For the assessment, individual project is an essential element to assess the understanding of the students' knowledge."

Recruitment of teachers is paramount, they should be recruited following specific criteria (teaching/pedagogical/didactic background, vocation, etc. - a lot of HE teachers become teachers due to other reasons); Instructional design and strategy to ensure curricula and programme coherence.

Q1-Answer 6: Innovation and standards monitoring. Student's preparation and appropriate level standards and structure are required

Q1-Answer 7: I would define quality in the HE context as a guiding principle AND the anticipated outcome of continuous efforts towards excellence and enhancement in all aspects of academic practice. I see teaching and assessment as parts of a wider quality system from an education management perspective. The "systems" analogy is useful in explaining the interrelation between different parts of a whole, but also in serving as a reminder that any system is only as good as its weakest component. Therefore, quality enhancements and assurance procedures must apply in all parts of the system. If Question 1 refers to how quality in teaching and assessment can be assured and promoted, the brief answer to such a big issue would be by ensuring that the whole system is geared towards promoting a quality outcome. This would include a purposeful approach to processes such as recruitment, selection, training, development, work allocation, evaluation, appraisal, reward, motivation and support of all faculty and staff. Furthermore, it would include purposeful specification of admissions criteria, targeted inductions to incoming and continuing cohorts, academic support mechanisms, academic regulations, academic infrastructure and facilities for students. This is again a very brief account of some of the components of an institutional approach to academic quality. Depending on how purposefully and competently the above are implemented, various strategies for each component may work very well towards promoting quality in all areas, including teaching and assessment. With regards to L5 and L6 teaching and assessment, I don't see the need to differentiate the approach. The emphasis regarding the expected manner of engagement or the level of sophistication associated with the particular levels of study will of course vary from lower levels, but the underlying philosophy should be exactly the same. In other words, why single out L5 and L6 courses when discussing teaching and assessment quality?

Q1-Answer 8: Critical engagement of the students.

Q1-Answer 9: integration and application of theoretical knowledge into current issues and debates, use of self-reflective practices, authentic learning activities.

Q1-Answer 10: Motivating and engaging students in knowledge input and output. Assessments need to be innovative, ensuring students have acquired content related skills and knowledge, teamwork and communication skills and ability to continuously improve themselves. Use of e-learning tools. Engagement with the market.

Q1-Answer 11: Quality in teaching:

- teaching content, which is associated with design of the syllabus and the expertise of the instructor;
- teaching strategies: use of innovative teaching approaches with focus on pedagogies of engagement and active learning: interactive lectures, class discussion, collaborative learning, problem-based learning, project-based learning, teaching through case studies and literature discussion, experiential learning (lab, field work), visual-based learning, debates and flipped classrooms are just a few examples.
- promote a culture of collaboration and sharing knowledge in teaching and learning (collaborative teaching and learning) and not a competitive environment

Quality in assessment:

- design assessments that promote an active learning approach and do not foster memorization, e.g. projects, critical thinking essays, group projects
- development of good assessment rubrics for the evaluation of student work; achieve consistency and fairness in student evaluation among instructors.
- evaluate assessment strategies on a regular basis for effectiveness in terms of meeting learning outcomes and revise them, if needed.

Q2-Answer 1: At level 4 knowledge transfer and to stimulate interest in the topic. At Level 5, knowledge transfer, but also critical thinking and research skills but also other skills such as building collaborative competence, teamwork, presentation skills, etc. (Of course, it all depends on the nature of the course.) At Level 6, there is of course still emphasis on knowledge transfer, but there is increasing emphasis on research, either through engaging domain-specific research or by imparting research competence. I am not sure I understand what 'qualitative features' means.

Q2-Answer 2: In my opinion, all of them are key factors for a quality teaching. I think that the balance and integration between all these issues are essential. I try to give high-quality contents and, at the same time, to make possible the participation and collaboration of students for an active learning. Enhancing critical thinking and promoting discussion is another important issue.

Q2-Answer 3: My teaching strategy is based on learning personalization approach. In terms of learning content, different content should be proposed for different students - there is no content suitable for all. For example, Visual learners prefer visual representations of presented material (pictures, diagrams, flow charts). Visual learners remember best what they see. They may forget information that is communicated to them verbally. Verbal learners prefer written and spoken explanations. Verbal learners remember much of what they hear and even more of what they hear and then say. They remember and learn well from discussions, prefer verbal explanation to visual demonstration, and learn effectively by explaining things to others.

Q2-Answer 4: -

Q2-Answer 5: Qualitative features are ensured by regular (self/hetero) evaluation strategies and collaborative work with other colleagues in designing strategies, implementing them and reflecting upon them.

Q2-Answer 6: Innovation, Always I use collaborative learning, students have just passed the required courses, and need my courses just to graduate. By extra course activities, and formative activities.

Q2-Answer 7: This is a personal judgement, as well as preference, but my approach prioritizes what I understand is meant by “qualitative features”. The entire design of all

courses I teach is based on the premise that students learn better when they understand the importance, usefulness, relevance, etc. of what they learn. I think there is greater value in understanding than in merely learning theories. The above can be communicated in many ways, e.g. through the choice of content, choice of perspective, assessment requirements, assessment marking criteria, the manner of engagement in classroom sessions, the follow-up and support offered to students throughout a semester in various forms, etc. My approach is to therefore design a well-arranged (as in musical arrangement) sequence of activities before, during and after a course to enable students to get the most out of the course and could showcase their learning as effectively as they can through the prescribed assessments. As in Q1, I employ the same approach when designing courses at L4, L5, L6, and L7. It is just the degree and type of expected attainment that changes.

Q2-Answer 8: Here you are asking different questions. Here is a summary response: a. I balance content knowledge with development of critical thinking skills; b. I do not assign group projects, so collaborative learning is restricted to class discussions, in groups or one-by-one, as well as in students' responding to each other's blog postings; c. I am not sure I understand this question; d. I use secondary materials that supplement students' exposure to course content; I ask students to interact with primary and secondary materials through blog postings and journal entries; I assign topics that demand synthesis of materials from different sources through students' critical engagement.

Q2-Answer 9: Focus: development of critical and analytical skills, tolerance towards ambiguity and deep understanding of sources of contradiction, application of evaluative criteria to assess self and peers.

- Concerns: balancing and managing depth and breadth of material to cover, select material that all students find appropriately challenging and personally interesting.
- Integration: update regularly learning material (reading list and formative assessments), invite experts or former students to present their work on current issues in class.

Q2-Answer 10: The effort is to create knowledge together with my students through the use of real contemporary exams.

Q2-Answer 11: Both delivering content related to the subject taught and parallel development of cognitive, practical and transferable skills are important; for higher level courses, these other transferable skills (e.g. collaborative, communication skills as well as the ability to do research) are more important.

Q3-Answer 1: In one of my courses I use blogs (on bb) to engage students in teamwork topics. Then using clickers, I organize a discussion on issues related to teamwork (e.g. value, challenges, remedies, etc.). Both have worked quite well so far.

Q3-Answer 2: On line: chats between groups of students. In the classroom, designing some activities for discussion and collaboration like "flipped classroom" by means of kahoot, for example.

Q3-Answer 3: The first activity is to identify students' learning styles. The other is to prepare content that is suitable for different groups of students according to their needs. The last is to propose students suitable content only.

Q3-Answer 4: Online forum.

Q3-Answer 5: monitoring and evaluation; combining evidence-based research with practice

Q3-Answer 6: Blackboard discussions/creation of products in within the classroom .

Q3-Answer 7: Fostering critical engagement in classroom discussions and assessments, and offering detailed, personalized feedback throughout a course.

Q3-Answer 8: Use of blogs and journals on Bb; group discussion.

Q3-Answer 9: class discussions, discussion boards, thought questions at the end of each lecture, assigned reading before a class.

Q3-Answer 10: Internet and short-projects that enhance discussion among team-members.

Presentation of results in class.

Q3-Answer 11: Internet and short-projects that enhance discussion among team-members.

Presentation of results in class.

Q4-Answer 1: Clarity of the question and choosing topics that effectively discriminate between those students that engaged effectively with the course content and those that have not; at the same time these topics/questions must not be too challenging for the students. All questions should require students to engage some level of critical thinking - higher in the case of Level 6. Questions should not require students to memorize. Again, I do not understand what 'qualitative features' means.

Q4-Answer 2: My main concerns are two: to learn concepts correctly and to learn them in a critical and applied way. Contextualizing the context in the right time and geographical space is also important. Through interactive classes, I try that each student can analyze the issues raised from a personal and individualized perspective.

Q4-Answer 3: Assessment should not be test-based but only competences-based. One of the methods I use while examinations is problem-based learning - I propose my students to solve a concrete problem on the course topic, and after 1 hour I collect their results and consider what is the level of the students' knowledge and skills.

Q4-Answer 4: It is not recommended that students copy the theory and concepts from book of lecture notes directly. They should complete the assessment in their own words. Also, I will tell the students, significant portion of marks will be given to the creation, innovation and application.

Q4-Answer 5: regular feedback.

Q4-Answer 6: Students are not committed to what they need to do about quality, and they aren't always engaged with the quality components of the assignment.

Q4-Answer 7: We may have a different understanding of quality features, but I would answer in a similar way as in Question 2 above.

Q4-Answer 8: I align assessments with learning outcomes and actual delivery of course content; I demand formative work (topic proposal, outline, literature review, first draft).

Q4-Answer 9: Concerns: time needed to support and mentor students to achieve LOs; the more original and open are the assignments the harder to develop a marking scheme that any second marker could apply to assess the work reliably. How: empirical projects, peer reviews, critiques.

Q4-Answer 10: The main issue relates to the synthesis of knowledge that is required for level 6 assessments. The second issue relates on how to test professional related skills. If with qualitative features mean ability to offer judgment, then interpretation and analysis of results is an integral part of the assessment questions.

Q4-Answer 11: The main issue relates to the synthesis of knowledge that is required for level 6 assessments. The second issue relates on how to test professional related skills. If with qualitative features mean ability to offer judgment, then interpretation and analysis of results is an integral part of the assessment questions.

Q5-Answer 1: I cannot think of anything. In the capstone project (L6), I would like to introduce a compulsory process of 'requirement to approve project components' before final submission to ensure the authenticity of the deliverable. Academic integrity is a fundamental issue in project work (and generally).

Q5-Answer 2: In my opinion, students are sometimes under pressure to get good academic results and often put this goal ahead of spending more time thinking and reflecting critically.

Q5-Answer 3: Assessment criteria are students' knowledge and skills to solve concrete real-life problems.

Q5-Answer 4: The most important issue is that students may not do their homework on their own. They can find source material from seniors and via internet. Lab session can be introduced so that students can complete the work during the lessons.

Q5-Answer 5: I'm quite happy with criteria applied by me and my colleagues.

Q5-Answer 6: I think that quality aspects are secured by the External Examiner .

Q5-Answer 7: Personally, I stopped using the prescribed assessment criteria for the various types of assessment components several semesters ago, as they were very generic and not helpful for the students or me as an instructor. My assessments always employ case-specific marking schemes that communicate to the students the evidence that I am looking for when awarding marks for different aspects of their performance. I also devote attention to the exact wording of assessment criteria in order to promote the type of manner of engagement I expect students to demonstrate. For example, when I need to see very specific coverage of a particular concept or theory framework I will

specify that in the marking scheme, but when I want students to demonstrate lateral thinking, critical reflection and imagination, again I specify that in the marking scheme.

Q5-Answer 8: No, I do not see any critical aspects of quality missing from EN assessments.

Q5-Answer 9: Assessment criteria cannot change if teaching time and marking period stay unchanged. Attitudes towards learning also need to change. The level of support needed for completed coursework is a missing element in assessment criteria which often results in differences on marking between instructor and second marker.

Q5-Answer 10: Synthesis of knowledge, use of real case studies, professional skills, such as teamwork, leadership.

Q5-Answer 11: Assessment criteria cannot change if teaching time and marking period stay unchanged. Attitudes towards learning also need to change. The level of support needed for completed coursework is a missing element in assessment criteria which often results in differences on marking between instructor and second marker.

Q6-Answer 1: I think that technologies are available, but implementation for less 'tech savvy' instructors may be a challenge. I'd say that I use 'traditional' technology; that could be improved.

Q6-Answer 2: Yes, I do. I try to improve every single day.

Q6-Answer 3: I like LMS/VLE like Moodle more because they it's more flexible in terms of suitability to personalise learning.

Q6-Answer 4: Yes.

Q6-Answer 5: Yes, but I prefer to use social media-based technologies.

Q6-Answer 6: Yes, I am .

Q6-Answer 7: Yes, the existing tools provide sufficient opportunities for instructors to employ various methods for helping different types of students learn very effectively.

Q6-Answer 8: Yes.

Q6-Answer 9: As an instructor I am satisfied with the resources and the level of support. Whether the use of technology makes a difference on student learning is to be

explored. Would be interesting to examine performance outcomes in courses where instructors use regularly technology as opposed to not.

Q6-Answer 10: Blackboard is a useful tool however, it is not an active learning tool.

Q6-Answer 11: As an instructor I am satisfied with the resources and the level of support. Whether the use of technology makes a difference on student learning is to be explored. Would be interesting to examine performance outcomes in courses where instructors use regularly technology as opposed to not.

Q7-Answer 1: I would say engagement of wider reading in the form of research, readings, etc. in all assessment components. Although I disagree with requiring students to cite sources in exams, I do agree that a 'textbook approach' at Level 5 and, especially, Level 6 is not appropriate. I also think that consistency across modules, sections, programs, department, etc. is paramount as student may learn something in one course and 'unlearn' it in another.

Q7-Answer 2: I believe that assessment is the most difficult part of teaching, in conjunction with qualification.

In my opinion, a balance must be sought between the theoretical knowledge acquired and the critical thinking developed by the student. Both aspects are essential. To evaluate both, I use mixed methods such as multiple-choice test (sometimes through online techniques) and, on the other hand, in addition, I usually evaluate through reflection questions, which I can ask on a classroom test or ask to be answered by means of an individual work, which also should be explained in front of class.

Q7-Answer 3: Competences-based assessment is vital.

Q7-Answer 4: ICT tool is the best way at this moment.

Q7-Answer 5: self and hetero assessment.

Q7-Answer 6: I think the most effective one could be experiential learning .

Q7-Answer 7: It should not come as a surprise (given my answers to the previous questions) that my answer is all the above. However, I should point out that I believe that quality in higher education is not simply about integrating elements of quality

(throwing in ingredients), but about how competently that is done (having a well-designed detailed recipe that is applied to perfection).

Q7-Answer 8: I feel I answer this above.

Q7-Answer 9: Teaching material: Elimination of textbooks or less reliance on textbooks and more use of reading lists for a start. Assessment: application of marking scheme to evaluate own work or work of peers

Q7-Answer 10: I think that project relate assessments that are assigned by corporate entities, like the business consulting course should be adopted. Also, more research-based assessments are required.

Q7-Answer 11: Teaching material: Elimination of textbooks or less reliance on textbooks and more use of reading lists for a start.
Assessment: application of marking scheme to evaluate own work or work of peers

Q8-Answer 1: Potentially yes. The TLC is a very good example, where 'best practices' or key pedagogical issues are presented and/or discussed. But these are not well attended, so this means that 'dissemination and sharing' is not very widespread.

Q8-Answer 2: This aspect is difficult to solve because there is some autonomy between departments. In my case, I try to agree with teachers from another department to link contents and give homage to the academic curriculum. But, in general, these are personal actions isolated from the general coordination of the departmental institutions.

Q8-Answer 3: Yes, it's important. For example, information on students' learning styles should be sharing among academic departments that are e.g. in charge of the same learning / study programme /curriculum.

Q8-Answer 4: Yes. Normally, every department will try to keep everything unchanged, because it is less time-consuming and troublesome. Teachers tend not to modify existing strategies.

Q8-Answer 5: Articulation between departments is not so common. There is still a tendency to work "per se".

Q8-Answer 6: It does. Interdisciplinary is such an example between marketing courses and IT ones.

Q8-Answer 7: It could, but not automatically.

Q8-Answer 8: What does "sharing among academic departments" mean? Is this a reference to interdisciplinarity? Knowledge dissemination in and by itself does not guarantee a learner-centric education and neither does interdisciplinarity (even though the latter encourages some autonomous critical thinking).

Q8-Answer 9: I am not sure mainly because 'learner-centric' as a term needs elaboration .

Q8-Answer 10: It is mainly a discussion between disciplines that enhance the development of learner-centric curricular. Most probably administrative structures such as the departments raise barriers rather than facilitating dialogue.

Q8-Answer 11: What does "sharing among academic departments" mean? Is this a reference to interdisciplinarity? Knowledge dissemination in and by itself does not guarantee a learner-centric education and neither does interdisciplinarity (even though the latter encourages some autonomous critical thinking).

Q9-Answer 1: I think that it does support in closing the loop. A very good example is the module leader report and the annual program evaluation. The problem however is when these processes become primarily bureaucratic (or are treated as such) as opposed to essential academic processes. For example, the MLR provides an opportunity for true reflection on the issues. However, often, MLRs are overly concise and not really demonstrating engagement and critical (self-) reflection.

Q9-Answer 2: In general, quality controls are done by providing evidence (materials, etc.). The teachers are compensated with curricular merits, if they demonstrate to contribute to the increase in the quality of the investigation. I believe that in addition to this compensation, academic institutions should stimulate interest and promote enthusiasm among teachers with prizes for teacher innovation or with effective supports to improve teaching quality.

Q9-Answer 3: Students-centred approach and competence-based assessment are vital

Q9-Answer 4: I have no comment.

Q9-Answer 5: More workshops, maybe the establishment of a community of practice.

Q9-Answer 6: No suggestions when talking about the British educational system.

Q9-Answer 7: The system in place is very good, but for several reasons (linked mostly, I believe, with relative inexperience on the part of many faculty and staff members) it is very bureaucratic to the extent that it yields limited results.

Q9-Answer 8: If done correctly, it does close the loop because it makes all of it hinge upon professed learning outcomes.

Q9-Answer 9: Too much power is given to students as experts evaluating teaching practices, without instructors having any ground to evaluate the validity of their input (students who might have irregularly attended classrooms or never visited BB or received feedback might evaluate a course. Favorable and unfavorable ratings by those students have poor validity). Without a section on demographic characteristics of participating students, it is impossible to use input effectively. The response rate on coursevals is very low raising skepticism as to the representativeness of views. Training of class observers might also contribute to the reliability of assessment from class observations and to the further improvement of assessment tool. Class observers can watch videos of classrooms, applying the instrument to assess teaching and discuss ratings.

Q9-Answer 10: I think that a quality assurance system currently doesn't exist. At least formally.

One way to improve the process is via the use of academic and industry reviewers.

Q9-Answer 11: If done correctly, it does close the loop because it makes all of it hinge upon professed learning outcomes.

Q10-Answer 1: I think it is pivotal and it does elevate the quality of education and learning provided. Deree following revalidation is a very good example. However, quality assurance needs to be applied consistently and needs to emphasize substantive issues as opposed to (merely) bureaucratic issues. There is also an issue of quality when it comes to the implementation of quality assurance.

Q10-Answer 2: I think it is very important to improve the quality of teaching. It is a dynamic and multifunctional task, which must be constantly evolving, trying to innovate to stimulate both students and teachers. Quality assessment systems should

also contemplate social dynamics because society is in a continuous context of innovation. However, these systems should be clear and concrete, so that the entire university community knows how their effort will be valued. All this must be done considering the main objective: to promote the adequate learning of every one of the students.

Q10-Answer 3: -

Q10-Answer 4: I have no comment.

Q10-Answer 5: Yes.

Q10-Answer 6: I am confident this helps academic achievements, overall, I think that compliance to different quality standards helps HE to go ahead.

Q10-Answer 7: I have published on this subject, arguing that having quality standards and procedures is not synonymous with obtaining the results that those standards and procedures are intended to achieve. Iβ€™d be happy to make my work available for the purposes of this study in case that would help.

Q10-Answer 8: It depends; quality assurance may straightjacket learning, by depriving instructors of the ability to improvise and deploy creative methods of teaching and learning.

Q10-Answer 9: Definitely. Quality assurance is an essential framework providing the structure of curriculum development. Compliance ensures consistency without necessarily resulting into deeper learning and achievement.

Q10-Answer 10: Not necessarily. Compliance doesn't always leverage quality.

Q10-Answer 11: It depends; quality assurance may straightjacket learning, by depriving instructors of the ability to improvise and deploy creative methods of teaching and learning.

APPENDIX B: A quantitative survey on academics' perceptions about quality and assessment

This quantitative research study is part of Emmanouil Varouchas's PhD studies. The main objective is the understanding of academics' perceptions on the integration of Quality in Higher Education. The aspects of quality, the ideas about perceptions on assessments, the different approaches to learning content and context design are integrated in a framework.

General Info

Which is your academic discipline or field of study:

Status:

Have you assumed or are you assuming an academic administration position (coordinator, head, director, dean)

Employed at:

Section 1 - Content Preparation

Provide your degree of agreement or disagreement with the following statements	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Adoption of teaching practices for achieving learning objectives is a key concern in my teaching content development approach					
Integration of multiple knowledge resources is a key concern in my teaching content development approach					
I typically integrate research outcomes and contributions to the modules/courses I teach					
I use references and material of superior quality for the preparation of my lectures and teaching notes					

2 - Process – Workflow

Provide your degree of agreement or disagreement with the following statements	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I systematically adopt international academic standards for the binding of the modules/courses I teach					
Students' learning needs is a critical factor for formulating my teaching strategy					
I apply a workflow with clearly defined stages for the preparation of my teaching content					
I integrate industry requirements and required skills in the process of delivering content					
Technology in terms of software and applications or services adds value to my quality approach in delivering content					

Section 3 - Engagement and Development

Provide your degree of agreement or disagreement with the following statements	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
The teaching and learning context should be customizable and flexible according to students' needs					
Students' engagement in learning and the promotion of critical thinking add value to my teaching strategy					
Cultivating innovative thinking is a key learning objective in my teaching approach					
Teaching should be tightly associated with skills' and competencies' building					
The multidisciplinary approach to teaching is critical for student learning					
Students' motivation should be developed through innovative teaching practices					
Increased students' engagement in learning leads to increased skills development					

Section 4 - Quality Integration

Provide your degree of agreement or disagreement with the following statements	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Professors/teaching staff are the key stakeholders for the implementation of quality in Higher Education					
Academic Administration has the role to build a culture of quality assurance in Higher Education					
Lack of resources is a key limitation factor for quality in Higher Education					
There is a gap in the understanding of quality dimensions between professors and students					
Assessing quality in Higher Education requires specification of certain metrics					
When present, quality in Higher Education enhances students' evaluation of academic programs					

APPENDIX C: A qualitative interview on Scholars Perception about Quality and Assessment - Round 2

This qualitative interview is the final component of E. Varouchas's PhD research. The focus is to acquire understanding of academics' perceptions on the integration of Quality into Higher Education - an elusive, multidimensional concept. Data collected from this survey are intended to enlighten the main perceptions of scholars for key performance indicators that promote the quality in Higher Education. This research tool is exploiting the findings of two previous rounds of qualitative and quantitative research. The overall intended outcome is a compact set of Key Performance Indicators for the promotion of quality in higher education.

- Question 1. How much effort do you place in the preparation of a required course in your discipline? Do you believe that the time you invest in the preparation of content is a key ingredient of quality? Elaborate on this statement. Other factors?
- Question 2. Which are the main technologies you deploy in your classroom? Can you elaborate on the added value contribution of the use of ICTs in your classes? E.g. what do you think about the use of educational videos from YouTube? Are there any prerequisites for the use of the technology in classroom?
- Question 3. To which extend do you use industry project engagements in your classes? Can you name some transferable skills acquired by students through these engagements?
- Question 4. Do you have any criteria for measuring the quality of the research work of your students? Are you interested in measuring the dissemination of their work? E.g. how many research papers are published from students work?
- Question 5. Do you promote discussion on a given topic among students in your classroom? Are you interested in the generation of new ideas on the topic discussed coming from students? How do you balance critical thinking and

knowledge transfer in your lectures? Any good recommendation, for example, 50% knowledge transfer and 50% critical thinking?

- Question 6. Do you constantly associate learning objectives to transferable skills? Do you assign a specific number of teaching assignments to students? Can you give as an example? For example, to promote critical thinking, I design the X assignment.
- Question 7. How much time you allocate in technology enabled teaching activities of your students? For example, 5% of total course time.
- Question 8. What about the interdisciplinary character in the courses you teach? Can you name how many contributions from different disciplines you utilize in teaching your courses? For example, in the X course I teach, I use main contribution from 4 disciplines: Computer Science, Sociology, Psychology and News Media.
- Question 9. If you were asked to write down a formula for the quality in higher education what factors would you include? For example, “Quality = Time Allowed for Preparation + Pedagogy + Student Engagement”
- Question 10. Name one metric from your own perception for the quality of education in higher education. For example, “Quality Metric #1 = # of Students Passed A Course/ # of Total Students Enrolled in this Course” or “Quality Metric #2 = # of Papers Presented in Conferences / # of Papers Delivered in a Course Assessment from Students”
- Question 11. What do you think about the role of quality assurance in achieving quality enhancements? Does compliance to quality assurance eventually elevate the quality of student-centered learning and assessment?

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Towards an Integrated Learning Analytics Framework for Quality Perceptions in Higher Education: A 3-tier Content, Process, Engagement Model for Key Performance Indicators

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Abstract. The integration of quality in Higher Education is multidimensional. Higher Education administration, programs, courses, procedures and evaluation provide the context for the application and diffusion of quality metrics. Our research intends to provide a holistic discussion on Key Performance Indicators (KPIs) related to quality in Higher Education. The analysis of the state of the art from recent literature resulted to the construction of two research tools. The first one is related to a structured agenda for a qualitative interview targeted at Higher Education administrators. The second is related to a quantitative research model that analyzes the relations of various quality factors. We provide a mapping of quality perceptions as discussed in previous work and we construct a theoretical model for the affordances of scholars to this perception. The research design includes interviews with Higher Education administrators and teaching staff, all involved in the creation of new academic programs and courses. The main contribution is an analytic discussion of perceptions of Higher Education administrators and instructors about quality that updates significantly the state of the art of the literature in interesting dimensions. As an outcome, we update the initial research model with the addition of a methodological framework for the quality integration in Higher Education. A three-dimensional value space with twenty factors is presented. The outcomes of this research work are used as input for our quantitative study. In fact, a list of 20 quality factors are exploited in three main dimensions of learning analytics namely: content, process and engagement. Key Performance Indicators are highlighted for further investigation.

Keywords: Learning Analytics, Quality, Higher Education, Academic Perceptions, Quality Integration, Quality Management, Higher Education Administration.

1. Introduction

The view of Louise Morley (2003) that globalization has had an impact on Higher Education (HE) has become a commonly shared view among academics and has been significantly affecting research in Higher Education. Additionally, globalization has lead Higher Education institutions to establish robust policies and measures for quality assurance applied to faculty development, research funding, academic program development and technology. From many perspectives found in the literature quality is a holistic converging critical success factor in the design of policies and strategies in Higher Education.

We are pinpointing McDonald's (2007) notion on quality assurance who claims that "in Higher Education, quality should not be rigidly 'defined', but seen as a flexible notion used in ways that are appropriate for the particular circumstances". Additionally, quality policies should be tailor-made to institution's goals and objectives, mission and stakeholders affected.

The interdisciplinary analysis of quality in the literature of Higher Education research is interesting and challenging. We have identified two dominant complementary perceptions of Quality. From one stand-point, Quality (as a critical success factor) is anticipated as a resulting outcome of many contributing factors in which well documented systems for their measurement attach values. One key research problem associated with this approach is directly linked to the perceptions of value metrics of overall quality. From a practical point of view, we need to establish transparent mechanisms for the measurement of quality and control mechanisms. From the other stand-point, Quality is perceived as a continuous improvement process, thus it is important to clarify and to support all the transformative stages that constitute the life cycle of quality development within an academic institution. This second approach is quite complex in terms of conceptual modelling requirements, mainly because of the great variety of institutions' mission, goals, and legislation.

As part of our research, we reviewed the literature through desktop research and the compilation of a significant number of scientific articles published in indexed impact factor journals for Quality Assessment in Higher Education, Total Quality Management and Knowledge Dissemination in the last 10-15 years. An important inclusion criteria was that the articles should discuss Higher Education quality in a comprehensive or broad view, as we attempt to complement studies that look at particular aspects as technology components (Sharma et al., 2017) or particular media for instruction (Zhang et al., 2017).

The initial research model was informed by the critical review of the literature and provided the basis for the focused structured interviews with ten Higher Education Administrators in Greece, which provided a more thorough understanding of the perceptions on quality components in Higher Education (see Table 1 below).

Articles	Variables					Implication					Criticality
	Content	Technology	Collaboration	Performance	Innovation	Teaching	Knowledge dissemination	Decision making	Curriculum design	Social Networks	
A model for total quality management in Higher Education (Asif et al. 2011)	X		X			X	X	X	X		High
Quality assurance in Higher Education: analysis of grades for reviewing course levels (Rexwinkel, Haenen & Pilot 2013)	X		X			X			X		Medium
Quality Assessment in Higher Education using the Servqual model (Đonlagić & Fazlić 2015)		X	X					X	X		High
Quality improvement and redesign of performance measurement systems: an application to the academic field (Franceschini & Turina 2011)	X		X	X			X	X			High
An instrument for measuring the critical factors of TQM in Turkish Higher Education (Bayraktar, Tatoglu & Zaim 2008)		X	X	X			X	X	X		High
The measurement of the construct satisfaction in Higher Education (Alves & Raposo 2009)	X			X		X			X		High
Specific remedy for specific problem: measuring service quality in South African Higher Education (de Jager & Gbadamosi 2009)		X					X	X			Medium
Factors influencing assessment quality in higher vocational education (Baartman, Gulikers & Dijkstra 2013)							X				Medium
Developing measures for performance excellence: is the Baldrige criteria sufficient for performance excellence in Higher Education? (Asif, Raouf & Searcy 2012)	X		X	X		X	X	X	X		High
Improving the measurement of productivity in Higher Education (Massy, Sullivan & Mackie 2013)	X	X		X			X	X	X		High

Table 1: Selected articles used to form the basis for structured interviews

The review of the literature shows that there are two main contested views regarding what are the priorities that universities have to set for maintaining all dimensions of

quality: (i) the view of Vidovich and Currie (2006) on quality assurance and the priority of the need to ‘prove’ that what universities claim that their students will learn it is exactly what students are actually equipped with when they graduate; and (ii) the view of Filippakou and Tapper (2008) on quality enhancement according to which the less bounded nature of enhancement will contribute to the enrichment of the student learning outcome – in other words to ‘improve’. The research model is informed by both views since we aim to justify the need for the creation of an instrument through which academic institutions will prove that they implement and use established quality frameworks, which produce KPIs for quality assurance and enhancement. At the same time, the research model is designed to collect the perceptions of academics regarding how quality factors are integrated into the development of curricula and in the process of teaching and learning.

2. Research Design and Methodology

This research was initiated by the following four main drivers:

1. Lack of applied methodologies focusing on the integration of curriculum design, delivery and outcomes assessment
2. Need for transparent mechanisms for the measurement and control of quality in curricula
3. Need to inform the curriculum design process with quality perceptions for a learner-centric focus
4. Need to investigate effective knowledge dissemination methods of tacit knowledge with the support of innovative Learning Management Systems.

To proceed with the research, in fall 2016 we carried out structured interviews with ten Higher Education administrators and professors in Greece, with the aim of reaching a more thorough understanding of the perceptions on quality components in Higher Education as well as informing the initial research model. More specifically, interviewees included academic department heads from the School of Business and the School of Liberal Arts and Sciences at Deree-The American College of Greece, all of them professors in various disciplines such as Information Management, International Business, Finance, Tourism and Hospitality, Psychology, and English.

The outcome of these interviews was used to complement the literature review and shape a structured questionnaire, which formed the main instrument for the collection of data from Higher Education community across the world and then for our quantitative analysis and testing of the main research hypothesis. The methodological approach we followed was comprised of 7 steps:

- Step 1: Literature Review: overview of Quality Variables to be used in the design of a research tool.

- Step 2: Design of the Initial Research model mostly informed by the critical review of Literature.
- Step 3: Focused Qualitative Research for Perceptions of Higher Education Administrators to inform and to update the initial of Research Model (see Appendix A).
- Step 4: Revised Research Model informed by critical literature review and by perceptions of key Higher Education Stakeholders.
- Step 5: Development of a research instrument for the collection of data on hermeneutic factors of quality (data collection from Higher Education academics in Greece and abroad).
- Step 6: Run of a quantitative analysis related to Learning Analytics: Application of Data Mining techniques to the data collected (see Appendix B).
- Step 7: Finalized instrument for quality assessment and implications of the research.

The basic dimensions for the design and the implementation of the research are the following:

- Desktop Research and a compilation of more than 100 scientific articles published in indexed impact factor journals for Quality Assessment in Higher Education, Total Quality Management and Knowledge Dissemination during the last 10 years.
- In-depth focused structured interviews with a first set of in-depth interviews with ten Higher Education Administrators in Greece, between spring and fall 2016. The main purpose of this study was to codify and understand their perceptions on Quality Components in Higher Education.
- Quantitative Research in Greece with the main target of collecting 120 questionnaires from academics in fall 2017.
- Execution of Learning Analytics for patterns recognition related to quality.
- A Framework for Quality Assessment that was informed and justified based on the outcomes of previous components. It was also compared with similar models found in literature to provide new insights to quality assessment.

For the purposes of our research, the following are the key integrative contributions:

- A multi-level instrument for Quality Measurement in Higher Education Administration
- A qualitative approach to Participatory Curriculum Design
- An applied research of Learning Analytics for Quality in Higher Education
- A thorough study for the exploitation of Knowledge Dissemination Theory as a key enabler of Quality Assurance in Higher Education Institutions.

3. Initial Research Framework

3.1 Integrating Qualitative Perceptions of Higher Education Administration

An element in the complexity of implementing a quality assurance system in higher education is the required balance between efforts towards quality improvement and the needs, values and attitudes of academic administrators who play instrumental role in this implementation (Boyle & Bowden, 1997). The aforementioned is supported by the view of Paliulis and Labanauskis (2015), whose perception of quality in higher education has at least two dimensions: structural (guidelines for quality management, definition of processes, instruments) and organisational value dimension (related to values skills and attitudes of members of the organisation). On the same note, to improve quality, quality assurance systems need to take into consideration the needs, values and attitudes of academics. One way to achieve the latter is through measuring quality perceptions of academic administrators.

The detailed research design presented in the preceding section has supported the collection of a significant number of qualitative data from Higher Education Administrators. In this section, the qualitative analysis of the data collected will be used with a threefold objective:

- First, to analyse the basic perceptions of Higher Education administrators and professors in terms of the complementary value components of quality. The objective is that the integration of their complementary aspects will enlighten a detailed mapping of quality metrics.
- Second, to reveal several concerns and limitations as perceived by administrators and professors related to the integration of the quality value components to the design of learning content and academic programs.
- Third, to emphasize on the understanding of hidden or existing relationships between quality perceptions and performance indicators from different perspectives. Thus, the next methodological step will lead to the clarification of several qualitative key performance indicators.

In the next paragraphs, we present a preliminary analysis of the basic findings. The analysis of data related to the quality perceptions of administrators and professors is quite interesting. Several value components are revealed, and their interpretation can guide the justification of various initiatives in Higher Education organizations. In a synthesis of their perceptions, the following aspects are considered as critical:

- Dimensions: Institutional / Individual Perceptions
- Teaching/ Research Integration
- Learning Objectives
- Critical Thinking

- Quality Reporting and Control
- Content Quality
- Skills Development focus
- Interactivity / Collaborative teaching
- Student Needs
- Flexibility in Learning Designs and Programs
- Discussing and agreeing teaching goals for students
- Regularly meeting during the semester and deciding on issues that arise collaboratively
- Linkage to Innovation
- Standards Adoption
- Guiding Principle and the Anticipated Outcome
- Workflow Model: an integrated approach to processes such as recruitment, selection, training, development, work allocation, evaluation, appraisal, reward, motivation and support of all faculty and staff
- Critical Student Engagement
- Knowledge Integration
- Self-Reflective Practices
- Technology Use
- Motivation and Engagement
- Innovative Methods
- Industry Integration
- Teaching Content
- Teaching Strategies support (interactive lectures, class discussions, collaborative learning, problem-based learning, project-based learning, teaching through case studies and literature discussion, experiential learning – lab, field work–, visual-based learning, debates, flipped classrooms)
- Interdisciplinary Integration
- Problem Solving Capabilities
- Skills building
- Cultural Enhancement.

A summary of the Quality Perceptions of interviewees and the key arguments provided by Higher Education Administrators and Professors is presented below per aspect/dimension of quality:

13. Institutional / Individual Perceptions - Teaching/Research Integration Learning Objectives (LOs) - Critical Thinking - Quality Reporting and Control:

- At the institutional level, it is important to ensure that faculty engaged in teaching have the appropriate qualifications (e.g. PhD in related areas, research) and demeanor
 - At the individual professor level, it is important to inform teaching with research and to approach the course from an academic perspective as opposed to a practical one.
 - Instructional and assessment methods need to support/assess the course LOs and the latter must be aligned with the level. Throughout the course LOs must be oriented towards conveying critical thinking skills (in addition to domain knowledge of course).
 - Quality assurance as it forces reflection and action for improvement.
14. Content Quality - Skills Development focus - Interactivity / Collaborative teaching: content should be updated to include in its design the academic disciplines students are pursuing. It should be focused on skills development. Moreover, interactive and collaborative teaching should be boosted for further engaging students.
 15. Student Needs - Flexibility in Learning Designs and Programs: quality of teaching and learning heavily depends on suitability of proposed courses to students' needs / characteristics e.g. learning styles. This means that all units of learning should be composed of components which are most suitable to students' needs (learning objectives / content, learning activities and learning environment, method of teaching).
 16. Discussing and agreeing teaching goals for students: in advanced to senior level courses (Level-5 and Level-6), high level concepts should be taught with the aid of conceptual diagrams and flow charts.
 17. Regularly meeting during the semester and deciding on issues that arise collaboratively:
 - For the assessing student learning, assigning individual projects is an essential element to assess the understanding of the students' knowledge.
 - Recruitment of teachers is of paramount importance: they should be recruited following specific criteria like teaching experience, pedagogical/didactic background, industry experience; instructional design and strategy to ensure curricula and academic program coherence.
 18. Linkage to Innovation - Standards Adoption: innovation and standards monitoring. Student's preparation and appropriate level standards and structure are required.
 19. Guiding Principle and the Anticipated Outcome - Workflow Model: an integrated approach to academic processes such as selection and recruitment of human resources, training, development, work allocation, evaluation, appraisal, reward, motivation and support of all faculty and staff:

- Define quality in the Higher Education (HE) context as a guiding principle as well as the anticipated outcome of continuous efforts towards excellence and enhancement in all aspects of academic practice. Teaching and assessment are viewed as parts of a wider quality system from an education management perspective.
 - Therefore, quality enhancements and assurance procedures must apply in all parts of the system. If the question is how quality in teaching and assessment can be assured and promoted, the brief answer would be by ensuring that the whole system is geared towards promoting a quality outcome. This would include a purposeful approach to processes such as recruitment, selection, training, development, work allocation, evaluation, appraisal, reward, motivation and support of all faculty and staff. Furthermore, it would include purposeful specification of admissions criteria, targeted inductions to incoming and continuing cohorts, academic support mechanisms, academic regulations, academic infrastructure and facilities for students. This is again a very brief account of some of the components of an institutional approach to academic quality. Depending on how purposefully and competently the above are implemented, various strategies for each component may work well towards promoting quality in all areas, including teaching and assessment.
20. Critical Student Engagement: critical engagement of students in learning via case studies, simulations, role playing, debates, education games and other methods.
21. Knowledge Integration - Self-Reflective Practices: integration and application of theoretical knowledge into current issues and debates, use of self-reflective practices, authentic learning activities.
22. Technology Use - Motivation and Engagement - Innovative Methods - Industry Integration:
- Motivating and engaging students in both knowledge input and output
 - Assessments need to be innovative, ensuring that students have acquired content related skills and knowledge, teamwork and communication skills as well as the ability to continuously improve themselves.
 - Use of e-learning tools, from traditional LMS that are known to have an impact (Zheng et al., 2018) to the most innovative that are being studied (Park and Kwoon, 2016).
 - Engagement with the market such as practical industry experience year or semester, projects and internships.
23. Teaching Content - Teaching Strategies:
- Quality in teaching involves teaching content, which is associated with the design of the syllabus and the expertise of the instructor. In regard to teaching strategies, academics consider the use of innovative teaching approaches with

a focus on pedagogies of engagement and active learning like interactive lectures, class discussion, collaborative learning, problem-based learning, project-based learning, teaching through case studies and literature discussion, experiential learning (lab, field work), visual-based learning, debates, flipped classrooms (these are just a few examples); promote a culture of collaboration and sharing knowledge in teaching and learning (collaborative teaching and learning) and not a competitive environment.

- Quality in assessment involves design assessments that promote an active learning approach and do not foster memorization, for example projects, critical thinking essays, group projects; development of good assessment rubrics for the evaluation of student work; achieving consistency and fairness in student evaluation among instructors; evaluating assessment strategies on a regular basis for effectiveness in terms of meeting learning outcomes and revise them, if needed.

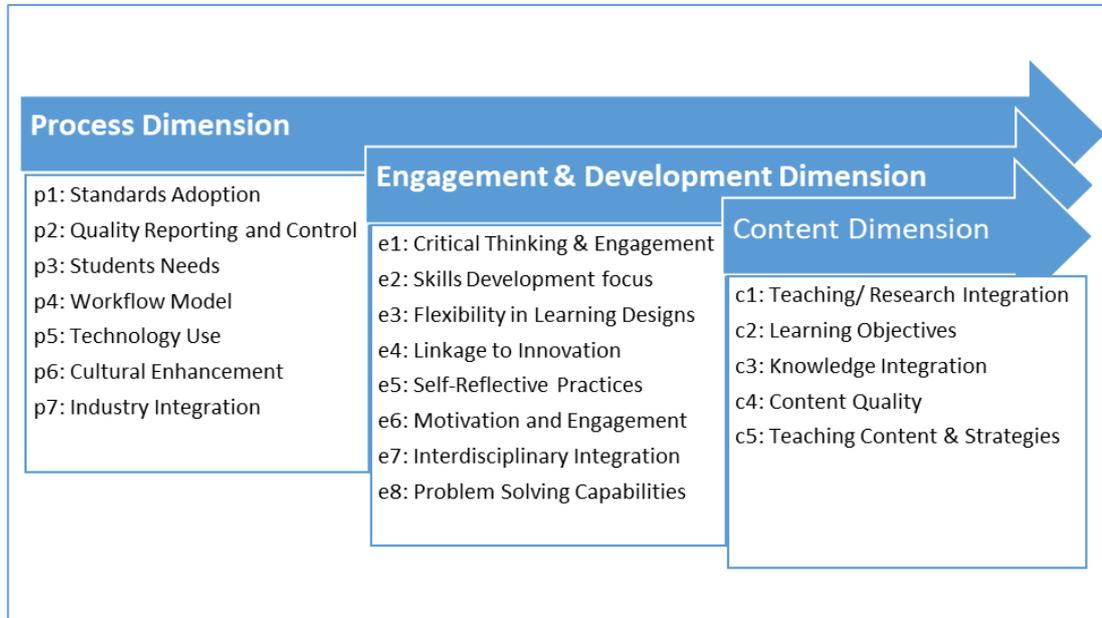
24. Collaboration Enhancement - Interdisciplinary Integration - Problem Solving Capabilities -Skills building - Cultural Enhancement: quality seems to be a multidimensional variable. In most cases though, the quality in teaching and assessment has a focus on absolute numbers, for example, the number of students with work after studies, amount of salary after the completion of a course and average assessment rate of a professor by the students. There are many aspects of quality that should be integrated somehow in the daily practices. For example, quality should promote collaboration, interdisciplinary integrations, is for sure related to processes and workflow management. It is a matter of Human Entities and Processes Integrations. It also implies an intrinsic motivation since it requires the engagement and the involvement of various stakeholders beyond the specification of its elements. Quality of teaching and assessment should integrate content quality, collaboration aspects, problem solving capabilities, plus a focus on the impact of education. Quality should promote skills building and culture enhancement, and not only a focus on content delivery. It is also important to facilitate the realization of quality elements with the use of technology-enabled processes and components.

4. The initial Learning Analytics Framework for Perceptions of Quality in Higher Education and a Preliminary Model of Quality Perceptions

The synthesis of the previous perceptions provides interesting insights. A first interpretation of the commentary aspect for Quality Perceptions is provided in our proposed model in Figure 1. In fact, a three-dimensional value integration space for Quality Value Components is well defined and is linked with the critical theoretical model which was presented in our previous work (Varouchas and Sicilia, 2017). The

value integration space include three dimensions and 20 value components as can be found in Figure 1. This is the point of departure for the rest of the research reported in this paper.

Figure 1. A Methodological Framework for Quality Perceptions in Higher Education



(Varouchas and Sicilia, 2017)

The various quality aspects / factors / value components have been mapped against three conceptual dimensions: the process dimension, the engagement dimension and the content dimension, and later parameterized to facilitate to run various data analytics tests and extract useful insights. (see Table 2 below).

	Questions	Components	Parameters
Factors (1-16)	Q1: Adoption of teaching practices for achieving learning objectives is a key concern in my teaching content development approach	c1	c.prac
	Q2: Integration of multiple knowledge resources is a key concern in my teaching content development approach	c3	c.reso
	Q3: I typically integrate research outcomes and contributions to the modules/courses I teach	c2	c.rese
	Q4: I use references and material of superior quality for the preparation of my lectures and teaching notes	c4	c.ref
	Q5: I systematically adopt international academic standards for the binding of the modules/courses I teach	p1	p.stds
	Q6: Students' learning needs is a critical factor for formulating my teaching strategy	p3	p.needs
	Q7: I apply a workflow with clearly defined stages for the preparation of my teaching content	p4	p.workf

	Q8: I integrate industry requirements and required skills in the process of delivering content	p7	p.ind
	Q9: Technology in terms of software and applications or services adds value to my quality approach in delivering content	p5	p.tech
	Q10: The teaching and learning context should be customizable and flexible according to students' needs	e3	e.flex
	Q11: Students' engagement in learning and the promotion of critical thinking add value to my teaching strategy	e1	e.engag
	Q12: Cultivating innovative thinking is a key learning objective in my teaching approach	e4	e.innov
	Q13: Teaching should be tightly associated with skills' and competencies' building	e2	e.skills
	Q14: The multidisciplinary approach to teaching is critical for student learning	e7	e.multid
	Q15: Students' motivation should be developed through innovative teaching practices	e6a	e.pract
	Q16: Increased students' engagement in learning leads to increased skills development	e6b	e.innovt
Quality integration (17-22)	Q17: Professors/teaching staff are the key stakeholders for the implementation of quality in Higher Education	p1	i.stake
	Q18: Academic Administration has the role to build a culture of quality assurance in Higher Education	p1	i.cult
	Q19: Lack of resources is a key limitation factor for quality in Higher Education	p1	i.lack
	Q20: There is a gap in the understanding of quality dimensions between professors and students	p2	i.gap
	Q21: Assessing quality in Higher Education requires specification of certain metrics	p2	i.metrics
	Q22: When present, quality in Higher Education enhances students' evaluation of academic programs	p1	i.qual

Table 2: *Quality components parametrization mapping*

5. Assessment of the instrument

As described earlier in section 2 and specifically step 5 of the methodological approach, the questionnaire designed and used for the collection of responses, attempts to measure different aspects of the perception of quality in Higher Education, in particular content, process and engagement and development. Variables are coded with the prefixes “c.”, “p.” and “r.” accordingly, to ease their association with the main dimensions identified in the review of the literature about the topic. The questionnaire also contained several demographic items characterizing the respondents, that are prefixed with “d.”, and finally, the items in the questionnaire that are related to integration of the other variables are prefixed by “i.”.

In this section, we assess the reliability of the questionnaire administered and analyze potential differences among groups of participants. The main aim is getting insights on the quality of the instrument and the relation among the dimensions identified. The analysis was done using the R statistical language version 3.3.2. The specific R

language packages installed and used are mentioned in the rest of the section when appropriate.

5.1 Correlation analysis

All questionnaire items across the three dimensions (content, process, and engagement and development) had medians of 4 or 5 on a five-point scale. This fact points out to an overall agreement on the opinions that all the items are important to the central construct of quality.

The detailed research design that we presented in the previous section, has supported that the correlations between the items in each of the dimensions and among dimensions are all moderate to strong (in the range of 0.25 to 0.5). Pearson correlations show moderate correlation of variables in each dimension, along with regression lines with positive slope. This is also the case when finding correlations of quality integration items with the rest of the items, with the exception of Learning objectives (c.rese) and quality integration gap between professors and students (i.gap) that are very slightly negative. That particular item together with the lack of resources as a key limitation factor for quality in Higher Education (i.lack) are the less positively correlated. In the second case, the wording of the item is referring to funding, which may be considered as controversial as related to quality, so this item deserves separate attention. In the former, there is convergence of views of quality between students and instructors - a controversial issue. However, quality integration items do not represent facets of the quality construct, so high correlation was not expected.

Regarding Internal Reliability, Cronbach's alpha measures are respectively 0.73, 0.73 and 0.84 for each of the content, process and engagement dimensions, which can be considered acceptable values. McDonald's omega values, providing an estimation without some of Cronbach's alpha assumptions are respectively 0.78, 0.8 and 0.89. These values are better estimations when we are attempting to measure several constructs, which may be the case with our three dimensions. When taking together all the items of the three dimensions, Cronbach's alpha is 0.9, showing a good internal consistency for the questionnaire. This indication of good consistency will be later detailed evaluating the extent to which there are different dimensions or a single unidimensional construct, using factorial analysis.

Regarding validity, face and content validity was addressed by the study of the literature and the qualitative part of the study. Here we focus first on convergent and discriminant validity, i.e. the convergence of items towards the same construct, and the differentiation of items across dimensions. Then, we address concurrent validity, in our case, for differentiating respondents that are known to be different demographically.

5.2 Factor Analysis

The detailed research design presented in the section, has supported that there are significant links between quality variables. The exploratory factor analysis for each dimension was conducted using the R statistical language with the “psych” package installed. The first step was that of testing for the number of factors in data. Using parallel analysis (`fa.parallel`) the suggested number of factors is three in a single component (see Figure 4 below).

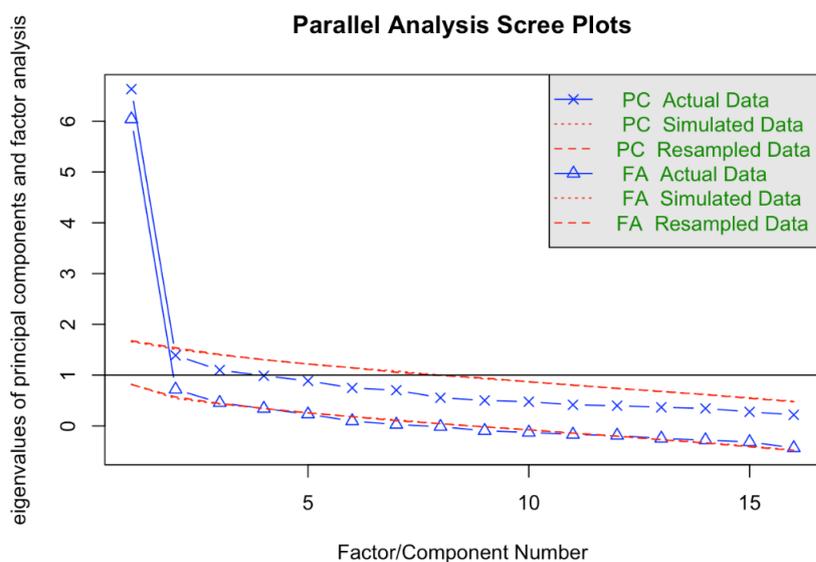


Figure 4. Output of parallel analysis for the quality items

However, finding the number of factors using the Very Simple Structure (`vss`) inventory of criteria in R suggests a smaller number of factors, namely one or two. Using Principal Component Analysis (PCA) to find a descriptive model of the data, we can observe differences between the first component and the rest, as evidenced in Figure 5 below.

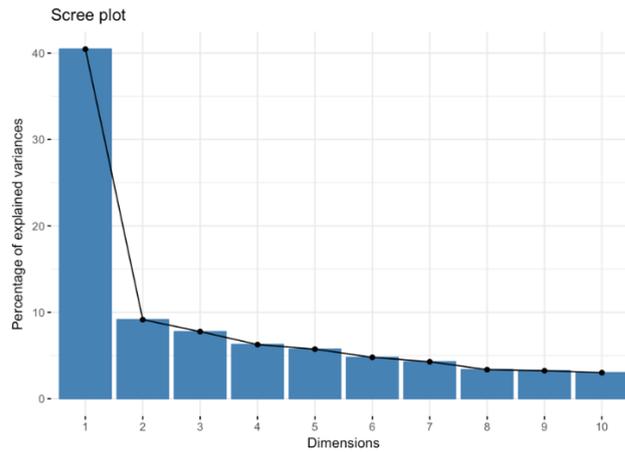


Figure 5. PCA results for the survey items

Observing the contributions of variables to the first dimension of the PCA does not provide insights on a structure that can be related to the three dimensions of the study, so that it is not clear from the analysis done if the three study dimensions are not affected by some other latent variables that can be considered as the main components of quality.

Figure 6 below, shows the path diagram for factorial analysis using weighted least squares for three components.

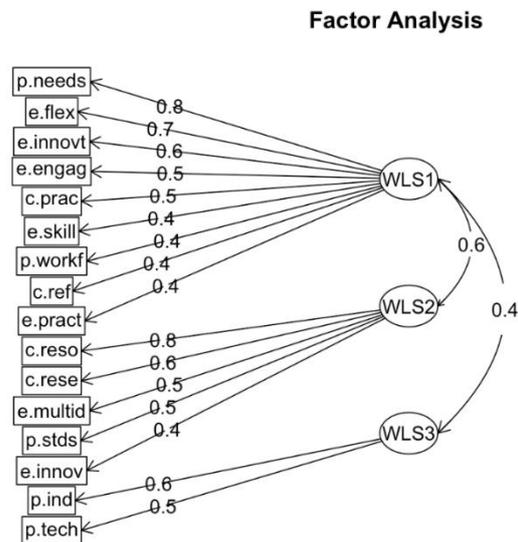


Figure 6. Factor Analysis for three components.

As can be seen in Figure 6, there are significant links of the latent variables to some of the observed ones that do not match the theoretical grouping of items in the questionnaire. This points out to a need for a more detailed analysis of the variables and how staff perceive the relationships among them.

6. Discussion of divergences in perceptions among respondent groups

The respondents of the survey can be considered as coming from different groups that may have heterogeneous appreciations of educational quality, and this is an important element to be evaluated. This requires careful examination of the possible differences among groups to detect potential divergences that may inform theory, challenge the notion of a single perception of quality, or suggest limitations of the research carried out given that the sample does not cover exhaustively different demographic groups. ANOVA was computed systematically for each item and each demographic group to test for differences in the mean for each of the items. Table 3 below summarizes the results of the analysis.

Groups	Items with differences (significance level in parenthesis)
External versus internal	c.prac (0.05), c.reso (0.05), p.stds (0.05), p.needs (0.0005), p.workf (0.05), p.ind (0.05), p.tech (0.05), e.engag (0.05), e.pract (0.01)
Director role	e.innov (0.05)
Type of contract	c.reso (0.01), e.skill (0.05)
Field of study	p.needs (0.05), e.engag (0.05)

Table 3. Results of ANOVA modeling for different demographic groups.

Significant differences between external versus internal respondents were found in the three dimensions, the most significant being *p.needs* and *e.pract*. The first refers to the importance of accounting for student needs in the design of the teaching strategy, and external respondents seem to relate this to a lower extent with quality. This may be hypothesized to point out to a potential difference motivated by institutions that are more curriculum-oriented or more learner-oriented. In the second case, the relation of innovative practice and student motivation is also different, but it is difficult to speculate about the reasons.

In any case, the differences in all dimensions point out to the need for more research that considers different institutional profiles. This may reveal cultural aspects that might be national, regional or institution specific., The results do not appear to indicate that

the dimensions are in conflict but just different weighting of some of the detailed aspects. Interestingly, there are no differences in the items regarding quality integration. It should be noted that in spite of a degree of internationalization in Higher Education (Altbach & Knight, 2017) the regulation and organization of educational systems is not homogeneous and this should be taken into account.

For teaching staff with administrative roles as contrasted with the others, significant differences were only found for *e.innov*. This difference in the weighting of innovative thinking for teaching may be attributed to seniority or background of teaching staff with an administrative role, but in any case, it does not appear to be an important divergence. Finally, in the case of type of contract, significant differences were found for *c.reso* and *e.skill*. It is again difficult to hypothesize why these may be differently perceived depending on the type of contract of the respondent, which can be an important dimension, as it might be that temporary versus permanent, or different levels in work positions may entail different understandings of quality as an organizational process. Figure 5 below shows the distribution of the different groups and an associated distribution estimation, but no clearly interpretable pattern has been found.

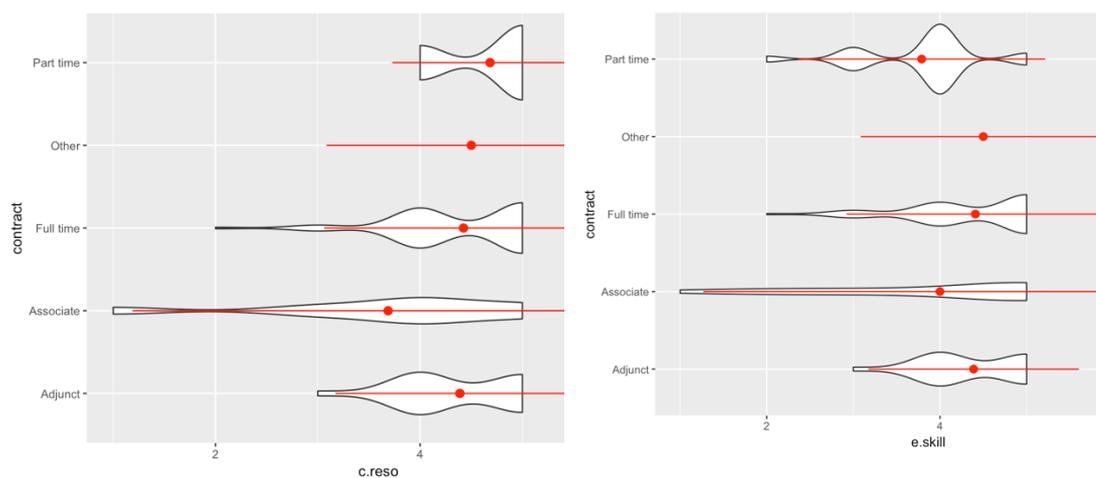


Figure 5. Distributions of responses for *c.reso* and *e.skill* in which type of contract differences were found.

Considering field of study, differences appear again in *p.needs* and *e.engag*. The former may be again a different perception between curriculum or learner-oriented fields. The differences in critical thinking importance may also be hypothesized to come from diversity in subject matters, but the sample is not broad enough across fields of study to come up with a clear interpretation that may differentiate among disciplines in regards to what is high quality education.

7. Conclusions and outlook

We have presented a model of the components of Quality in Higher Education based on an extensive collection and consolidation of quality elements found in the literature. The model considers a large number of concrete and specific aspects, complementing previous models that are described in generic categories or aspects (Owlia & Aspinwall, 1996). A questionnaire was devised to validate the framework and gather additional information on the various factors underlying the notion of Quality.

Survey results pointed out that all the elements identified are important to the central construct of quality. The detailed research design that we presented has supported that the correlations between the items in each of the dimensions and among dimensions are all moderate to strong. Factor analysis indicated that there are significant links of the value components to some of the observed ones that do not match the theoretical grouping of items in the questionnaire in the three distinct components of process, engagement and contents. Therefore, the quality variables could be further re-arranged in groupings to have stronger links and identify independent aspects. Also, the analysis has revealed a clear need for further investigating inter-institution or even national, regional divergences in perceptions of quality across all dimensions, but pointed out to a weaker importance of differences related to the respondents' position.

In any case, the differences in all dimensions point out to the need for further research that considers different institutional profiles, curriculum or learner-oriented, innovative practices and student motivation, diversity in subject matters, and the type of contract of the respondent. The findings suggest the need of additional inquiry in future work. Concretely, in-depth interviews with Higher Education administrators and faculty appear as a promising vehicle for advancing in the directions pointed out in the discussion. This would eventually allow for a formulation of Key Performance Indicators (KPIs) based on a deeper understanding of the different independent dimensions of the quality construct.

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Academics' Perceptions on Quality in Higher Education Shaping Key Performance Indicators

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Abstract: Institutions in Higher Education (HE) continuously strive to develop and deliver impactful educational programs. At the same time, they should continue to fulfill their mission to educate students in basic applied subjects and in parallel respond to the need of equipping students with new skills. For this reason, Higher Education Institutions (HEI) perform periodical curricular reviews adhering to internal and external quality assurance systems. The subsequent curricular reforms are of transformative nature preparing graduates to tackle with the challenges of globalization, unemployment and vanishing professions. For these reforms to lead to sustainable curricula, the integration of quality into educational programs is instrumental. A suggested way to achieve a transformative stance is to provide the context for the application and diffusion of quality metrics in teaching and learning. This research intends to provide a discussion on Key Performance Indicators (KPIs) related to quality. This paper presents the second round of qualitative interviews with higher education administrators and professors as a promising vehicle for advancing towards the formulation of KPIs based on their understanding of the different independent dimensions of the quality construct. These KPIs will provide valuable insights into improving teaching, learning an assessment and eventually lead to sustainable curricula. Research findings outline the significance of time invested for designing and updating a course, indicate that technology enhanced learning solutions are perceived as key quality drivers, and point out the need to align courses with industry requirements and real-world problems. Additionally, findings indicate that the quality and impact of teaching and learning is promoted by the multi/inter disciplinary character of a course, the engagement of students in interactive discussions and student research as part of summative assessment. The main contribution of this research is an analytic discussion of perceptions of higher education administrators and professors about quality, leading to significant enrichment of the relevant literature. A set of innovative generic KPIs which can be used in multidimensional quality assessment in higher education is eventually proposed.

Keywords: Quality; Sustainable Curricula; Higher Education; Quality Metrics; Key Performance Indicators.

1. Introduction

Without doubt, the University is no longer a quiet place to teach and do scholarly work at a measured pace and contemplate the universe as in centuries past. It is a big, complex, demanding, competitive business requiring large-scale ongoing investment [1]. Higher Education today is challenged by global unrest, regulatory compliance, technology disruption, emphasis on admissions, societal demand for better education and the fact that students are rewriting the rules. To be able to respond to these challenges, HEIs need to adapt quickly and change what they have been doing in a mediocre way, capitalize on what they do excellently and make quality a necessary ingredient of their core competency: the curricula. To achieve this, academics need to view quality as a means of continuous improvement and realize that curricula are continuously evolving living structures. In other words, quality should be considered as the pivotal instrument for the transformation of HEIs.

Due to the increase in societal demand for higher education, the needs for diverse skills required in the context of globalization (exploratory skills, exploitation skills, management skills, moral and ethical skills, etc.), and the processes of internationalization and diversification in higher education, a growing concern has emerged regarding the quality of higher education inputs, processes and outcomes [2] - the concern to define simple, measurable quality indicators. At the same time the negative effects of heavy reliance on control by such indicators have been highlighted [3].

Considering the above points, this research was mainly motivated by the fact that there is lack of methodologies and tools for measuring quality factors in higher education teaching, learning and assessment, and for producing quality metrics in support to closing the loop from measuring quality to curriculum enhancement and possibly reform. Additionally, the aim is set towards the direction that the findings of this research will benefit higher education stakeholders and policy makers internationally in further understanding the value of quality metrics on teaching learning and curriculum for the advancement of the education offered to students.

The main purpose of this paper is to present the main methodological work as it relates to Steps 3 and 6 of the research model presented in section 3, Figure 1, and the key findings of two rounds of qualitative research presented in sections 4.1 and 4.2 respectively:

Round 1: this first round was performed for the specification of the constructive perceptions of higher education administrations for the determinants of quality. For this purpose, a thorough critical literature review resulted into the specification of several parameters which define quality. In section 4.1 the key findings of this qualitative analysis are presented

Round 2: the main purpose of this qualitative research was to construct a theoretical framework about an integrated model of quality in higher education, aiming to understand metrics or key performance indicators for the main dimensions of the tested model. In section 4.2 the key findings of this qualitative analysis are presented.

2. Literature Review

University quality and its measurement have been on the agenda of university policy since the 1980s [4]. It is commendable to pinpoint McDonald's [5] notion on quality assurance who claims that "in higher education, quality should not be rigidly 'defined', but seen as a flexible

notion used in ways that are appropriate for the particular circumstances". Additionally, quality policies should be tailor-made to institution's goals and objectives, mission and stakeholders affected. Moreover, the view of De Ketele [6] that quality is a concept difficult to define due to its multidimensional and relative nature is acknowledged. In the same sense, Sanyal and Martin [2] suggest that because quality means different things to different stakeholders and it is difficult to reconcile all of them, so the definition of quality is a political process.

For once more, Deming [7] borrows ideas from the world of business to justify the need for quality in higher education. He says: "How can quality of teaching, learning and curriculum be improved? Is it enough to say that we as tutors, teachers, professors, staff or management of an educational institution are doing their best efforts? It is almost obvious that if everyone is doing their best efforts towards a different direction, efforts most probably will not bring the expected result. For individual best efforts to be effective, there is a need of a common vision, goals, and guidance. Ultimately there is a need for an orchestrating plan and a specific process towards the achievement of better quality".

Against Deming's ideas, McDonald's [5] notion on quality assurance is posed: "Quality in higher education is not the simple concept that it can be in commerce, and industry. Quality may have one or more meanings, depending on the stakeholder, the relevant goals and objectives, and the mission of the institution. Thus, in higher education, quality should not be rigidly 'defined', but seen as a flexible notion used in ways that are appropriate for the particular circumstances".

As university education is evolving, McLean [8] points out that "individuals and institutions can be transformed for better and worse whether or not we are seeking radical change". McLean's point of view finds us in agreement and we further develop it by saying that the academic 'transformation' encompasses innovative teaching methods and pedagogies, more technology-infused curricula and measurement of the above.

On another note and referring to sustainable curricula, according to Sterling [9], sustainability is not just another issue to be added to a curriculum, but rather can be a gateway to a different view of curriculum, pedagogy, organizational change, policy, and ethos. At the same time, HEIs are expected to play a significant role in contributing to creating a more sustainable world through their major functions of education, research and outreach [10]. Considering the point of views of Sterling [9] and Fadeeva and Mochizuki [10], there is evident correlation between quality education and sustainable development. One of the challenges academic institutions in higher education are facing is that of planning for and ensuring sustainability of their academic programs. This is probably the biggest challenge since in its epicenter lies the development of quality curricula - the core competency of higher education institutions. At this point it is necessary to clarify that the perspective from which the term "sustainability" is viewed, emphasizes how education can become more sustainable and not education for sustainability which involves mainly environmental theories and practices.

In further reviewing the literature of higher education research, two dominant complementary perceptions of quality have been identified. From one standpoint, quality is anticipated as a resulting outcome of many contributing factors in which well documented systems for their measurement attach values. Consequently, the measurement and management of quality is a matter, which keeps away higher education stakeholders from an agreement to apply a standardized set of tools and measurable indicators, notably customer perception, value and repurchase intention have been investigated lately as purely external

ones [11] but here focus is placed on the internal factors. One critical research problem associated with this approach is directly linked to the perceptions of value metrics of overall quality, which then may be connected to perceptions and measures of value as perceived by students [12]. From a practical point of view, transparent mechanisms for the measurement of quality and control mechanisms need to be established. From the other standpoint, quality is perceived as a continuous improvement process, thus it is important to clarify and to support all the transformative stages that constitute the life cycle of quality development within an academic institution. This second approach is quite complex in terms of conceptual modelling requirements, mainly because of the great variety of institutions' mission, goals, and legislation under which the latter operate. In the following section, the drivers and methodological approach for the study of quality perceptions in higher education are presented.

The researchers' notion of quality in higher education from the stand point of a practitioner involved in teaching, student advising, and designing courses and academic programs, is that quality in education is a multidimensional issue having the following interwoven dimensions:

- ⊙ quality in the curriculum,
- ⊙ quality in teaching,
- ⊙ quality of the country's education system
- ⊙ quality in facilities, academic resources and support
- ⊙ quality in external quality assurance framework
- ⊙ quality in internal quality assurance framework
- ⊙ quality in learning outcomes and graduates' knowledge and skills.

This notion has been primarily informed by the researchers' teaching, research and academic administration professional experience in higher education. To maintain high quality standards in all dimensions, HEIs have the responsibility to adjust and develop strategies to respond rapidly to the changes in student learning needs, emerging skills, legislation and global economy, and mandates from stakeholders. As a result, HEIs are faced with the need to reform many of their existing management practices and mindsets. To this end, Key Performance Indicators is a fundamental concept in measuring performance in multiple contexts [13]. Even though HEIs are required to keep track of KPI's for external regulatory compliance purpose as well as for internal administration of resources, there is lack of a standardized set of KPIs measuring quality in multiple dimensions and especially quality in teaching, learning and curriculum. The main reason is that it is hard to capture in a KPI "qualitative indicators" like descriptions, observations, comparisons based on non-numerical data, assessment of the degree of students learning and the overall student experience from an academic program of study. According to Chalmers [14], these performance indicators typically do not involve generating the quantity of outcomes in the form of numerical data but measure complex processes and results in terms of their quality and impact. On the other hand, "quantitative indicators" are defined as those associated with the measurement of quantity or amount and are expressed as numerical values; something to which meaning or value is given by assigning it a number [14].

3. Research Methods

Through the findings of this research the primary aim is to fill the gap of missing KPIs to be used by universities for measuring quality in teaching, learning and curriculum. The formulation of the afore-mentioned aim stems from reviewing literature on measuring quality

dimensions in teaching and curriculum design, from our experience as academics and the need for continuous improvement in academic programs. As a result, the following four main drivers prompted this research:

- Lack of applied methodologies focusing on the integration of curriculum design, delivery and outcomes assessment
- Need for transparent mechanisms for the measurement and control of quality in curricula
- Need to inform the curriculum design process with quality perceptions for a learner-centric focus
- Need to investigate effective knowledge dissemination methods of tacit knowledge with the support of innovative Learning Management Systems.

The methodological approach followed was initially presented in a paper by Varouchas, Lytras and Sicilia in 2016 [15] and involves seven steps outlined below:

Step 1: Conduct literature review: overview of quality variables to be used in the design of research tool

Step 2: Design of initial research model mostly informed by the critical review of literatures

Step 3: Perform focused qualitative research for perceptions of higher education administrators to inform and to update the initial of research model

Step 4: Revise research model informed by critical literature review and by perceptions of key higher education stakeholders

Step 5: Run quantitative analysis related to quality metrics: application of data mining techniques to the data collected

Step 6: Develop a prototype research instrument for the collection of data on hermeneutic factors of quality (data collection from higher education academics in Greece and abroad)

Step 7: Finalize instrument for measuring quality KPIs and implications of the research.

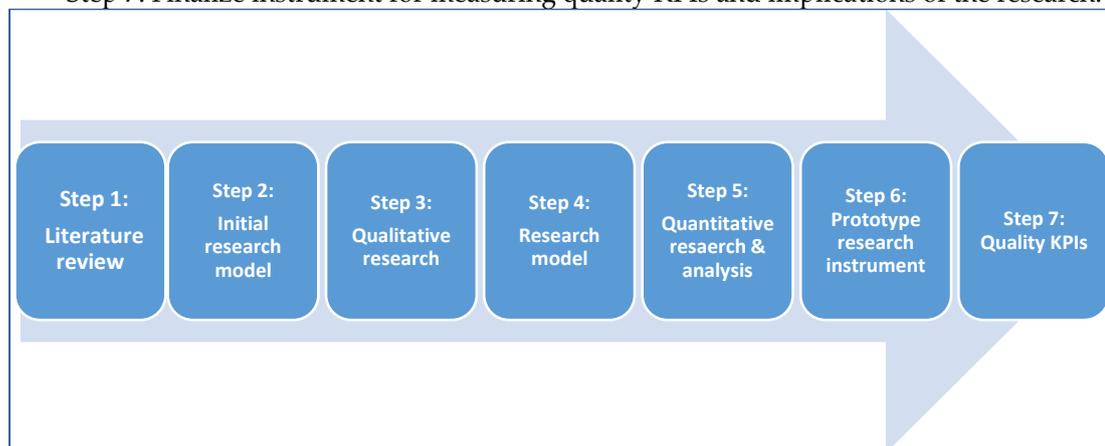


Figure 1. Methodological steps in the research

The literature review involved desktop research and compilation of at least one hundred scientific articles published in indexed impact factor journals for quality assessment in higher

education, total quality management and knowledge dissemination in the last 10-15 years (Step 1 of the methodology). The initial research model was informed by the critical review of the literature and provided the basis for the two rounds of qualitative focused structured interviews.

Following this, the first round of qualitative research through structured interviews with ten (10) higher education administrators and professors in Greece was performed, aiming at a more thorough understanding of the perceptions on quality components in higher education and informing the initial research model (Step 3 of the methodology). More specifically, interviewees included academic department heads from the School of Business and the School of Liberal Arts and Sciences at Deree-The American College of Greece, all professors in various disciplines such as Information Management, International Business, Finance, Tourism and Hospitality, Psychology, and English. The outcome of their input was used to complement the literature review and shape a structured questionnaire, which formed the main instrument for the collection of data from higher education community across the world and then for quantitative analysis.

Afterwards, as indicated by Step 5 of the methodology, the quantitative study derived a 3-tier Content, Process, Engagement model with twenty quality factors, and highlighted a set of key performance indicators for further investigation (see Section 4, Figure 3).

Finally, a second round of qualitative research through focused structured interviews have been performed with thirteen (13) higher education administrators and professors from Greece and abroad, aiming at a more thorough understanding of the perceptions on quality components in higher education and at producing Key Performance Indicators (Step 6 of the methodology). More specifically, interviewees included deans and academic department heads from the School of Business and the School of Liberal Arts and Sciences at The American College of Greece, and professors in various disciplines such as Information Management, International Business, Finance, Tourism and Hospitality, Psychology, and English. More specifically, the interviewee list included professors from Greece, the United States, the United Kingdom and Spain. Interviewees were selected because of their willingness to participate and contribute to this research, their deep knowledge of teaching and assessment practices and their experience in administering academic units at their universities. At this point it is necessary to clarify that the second round of interviews did not include the same participants as round one.

Regarding the methodology adopted for analyzing the qualitative data gathered from the interviews, the Constant Comparison Method was used. As Maykut and Morehouse [16] point out: "words are the way that most people come to understand their situations; we create our world with words; we explain ourselves with words; we defend and hide ourselves with words". Thus, in qualitative data analysis and presentation: "the task of the researcher is to find patterns within those words and to present those patterns for others to inspect while at the same time staying as close to the construction of the world as the participants originally experienced it. Qualitative data analysis involved identifying, coding, and categorizing patterns found in respondents' perceptions was performed. More specifically, line-by-line analysis of the text of the responds, codes were given to words or phrases that represented units of data associated with a concept was performed. Then, quality perceptions were grouped into categories that best fit the data. The categories that were apparent related directly to the questions asked in the structured interview.

As far as the number of participants is concerned, according to Baker, Edwards and Doidge [17] the amount of qualitative data does not depend on the number of interviews but on the depth of the interview and how well the researcher uncovers participants' thoughts. Additionally, a small number of participants can offer researchers insights into research projects that target participants from a specific group (e.g. department heads, faculty).

In the next section the key findings of the qualitative analysis are presented.

4. Results and discussion

4.1. First round of qualitative research

The detailed research design presented in the previous section has supported the collection of significant number of qualitative data from higher education administrators. In this section, the qualitative analysis of the data collected has a threefold objective:

- First, to analyze the basic perceptions of higher education administrators and professors in terms of the complementary value components of quality. The objective is that the integration of the perceived complementary aspects will enlighten a detailed mapping of quality metrics.
- Second, to reveal several concerns and limitations as perceived by administrators and professors related to the integration of the quality value components to the design of learning content and academic programs.
- Third, to emphasize on the understanding of hidden or existing relationships between quality perceptions and performance indicators from different perspectives. Thus, the next methodological step will lead to the identification of several qualitative key performance indicators.

Several value components are revealed, and their interpretation may guide the justification of various initiatives in higher education organizations. Additionally, several quality perceptions of interviewees and the main arguments outlined in their statements, have been mentioned repeatedly in the clear majority of responds. At the same time, the opinions of respondents on their perceptions have coincided in all responds.

In a synthesis of their perceptions, respondents' arguments have been clustered to formulate a set of aspects of perceptions considered critical in integrating quality in the educational process. The key arguments provided refer to teaching qualifications instructors need to hold, together with research activity they demonstrate every academic year. So, well-qualified and research active faculty are able to inform their teaching through research in their field and at the same time assist students in reaching learning outcomes at course and program level. Additionally, respondents argue that teaching content should be customized to address course learning outcomes, and different student learning styles. In this way, students will be motivated to engage in active learning and consequently develop skills in team work, problem-solving, technology and innovation among others. Moreover, most respondents pointed out the importance of integration and application of theoretical knowledge into addressing real-

life problems and situations. This could be achieved through innovative assessments and student engagement with the industry and job market.

It was interesting to observe that respondents with academic administration experience and service in university committees, agree that quality can only be maintained through an established quality assurance system, with clear, automated procedures geared toward promoting quality outcomes.

The synthesis of the previous perceptions provides numerous interesting insights. A first interpretation of the commentary aspect for quality perceptions is provided in the proposed model in Figure 2. A three-dimensional value integration space for quality value components is well defined and is linked with the critical theoretical model that was presented in previously published work. According to Varouchas and Sicilia [18], the dimensions and the value ingredients of this value space include three dimensions and twenty (20) value components, which require further investigation (see Figure 2 below).

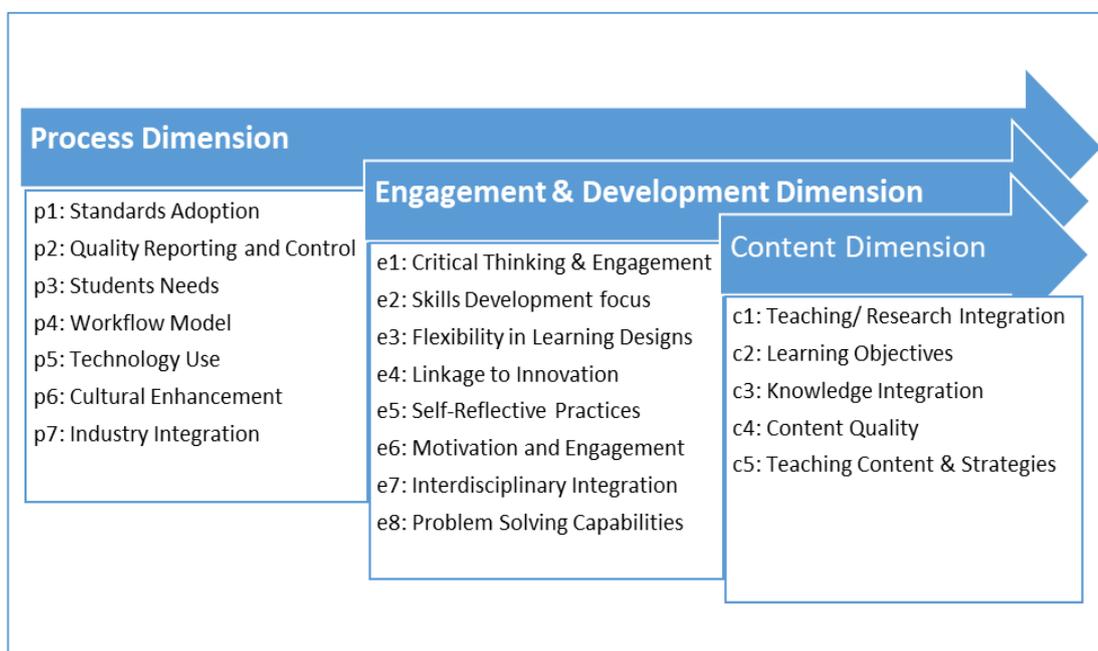


Figure 2. A Methodological Framework for Quality Perceptions in Higher Education (Varouchas and Sicilia, 2017)

4.2. A second round of qualitative research – drafting KPIs for quality measurement

Having developed the key contribution summarized in Figure 2 above, a subsequent thread of qualitative research strategy is required to elaborate and confirm several quality measurements. For this reason, a second round of focused structured interviews with key stakeholders (academic deans and department heads) were conducted. As mentioned in the introduction, the main purpose of this qualitative research is to understand some metrics or key performance indicators for the main dimensions of the tested model.

Once more, the Constant Comparison Method was used for analyzing the qualitative data gathered from thirteen interviews with academic administrators and professors in higher

education. Following analysis and codification of a detailed research agenda, a summary of the main findings which include constructive responses for the formulation of constructs and candidate KPIs is presented below.

Construct 1: Time for Preparation of Courses / Effort invested in Design

Question 1: *How much effort do you place in the preparation to teach a required course in your discipline? Do you believe that the time you invest in the preparation of content is a key ingredient of quality? Elaborate on this statement.*

Construct #1 Summary of Findings – Key Quotes
<ul style="list-style-type: none"> To teach a course effectively, one would need over 3 hours of preparation per credit hour per week; in addition to this, a faculty member needs to be constantly informing oneself on developments in their field of expertise, which adds significantly to the minimum preparation time cited above.
<ul style="list-style-type: none"> Preparation of the content is a key quality factor in teaching for two main reasons: for addressing learning objectives and outcomes and for making the course interesting to students
<ul style="list-style-type: none"> I would guess that It would take me between 25 to 35 hours to teach a required course in economics or finance. This time differs for the principles classes, which I have taught for decades and are easier for me to prepare, while upper level classes typically require more time. Yes, I certainly do believe that the time spent is an indicator of quality.

Main Finding: It is evident that time devoted for preparing a course is critical as well as the time devoted to update material and to engage students with learning content and context. One generic KPI which will further be developed in future research, is recommended:

- Preparation Time** = Developments of the Field + Frequency of taught+ Motivation Time + Engagement Scenario + Core Knowledge

Construct 2: Technology Enhanced Learning utilization

Question 2: *Which are the main technologies you deploy in your classroom? Can you elaborate on the added value contribution of the use of Information & Communication Technologies (ICTs) in your classes? For example, what do you think about the use of educational videos from YouTube? Are there any prerequisite factors for the use of the technology in the classroom?*

Construct #2 Summary of Findings – Key Quotes
<ul style="list-style-type: none"> I use PowerPoint and videos in every lecture (videos that present company cases or examples), and a simulation game.
<ul style="list-style-type: none"> Moodle provides the basis for most of my modules. It is important that the taught content of the video is placed properly in the context of the LOs and assessment units I have designed. I have also experimented with 'clicker' technology in larger lectures - to get some instant feedback from the students on the degree to which an important element of a course has been understood.
<ul style="list-style-type: none"> Blackboard tools (i.e. journals, blogs, and discussion forum) contribute to making the class more interactive and facilitate exchanges both between the instructors and among students. They also allow for class discussions to be extended online, facilitate the supervision of projects (work in progress), peer review, coordination of group assignments between students. As far as teaching is concerned, I use ppts in which I frequently embed audio-visuals, stills links to interesting articles or research findings, as well as educational videos. The use of ICTs is essential for today's teaching environment: It can be used to illustrate in a student- friendly way elaborate ideas or concepts;

<p>promotes a more interactive approach to teaching and learning; can facilitate class discussions; is compatible with the habits of the generation of "digital natives" and our culture's emphasis on the visual.</p>
<ul style="list-style-type: none"> • The main technologies that I use are: Blackboard/Canvas; Excel and video content from sources like Khan Academy, YouTube, TED talks and Merlot. Current media such as CNN, CNBC etc. are also used.

Main Finding: It is evident in the responses that technology enhanced learning solutions are perceived as key quality drivers in higher education. There is a variety of approaches and technologies available. One generic KPI which will further be developed in future research, is recommended:

- **Technology Infusion** = (Blended + CMS) / Traditional

Construct 3: Academia – Industry Partnerships

Question 3: *To which extend do you use industry project engagements in your classes? Can you name some transferable skills acquired by students through these engagements?*

Construct #3 Summary of Findings – Key Quotes
<ul style="list-style-type: none"> • My aim is to use in all my courses live assignments, but I try also to maintain the relevant equilibrium in the themes of the assignment, and the topics. Transferable skills could be professionalism, teamwork, and leadership
<ul style="list-style-type: none"> • Industry project engagements provide students with practical problem-solving skills; realistic development goals; customer-facing skills; project management, planning and reporting skills.
<ul style="list-style-type: none"> • Executives from the company deliver the project brief to students, deliver company presentations, provide support to student teams and they attend the final student presentations. • Transferrable skills are built through these projects in varying degrees: communication skills, reporting skills, presentation skills and teamwork skills, leadership, time management, negotiation

Main Finding: It is evident that most respondents recognize the need to align their course with industry requirements and real-world problems. Thus, a critical component in the proposed KPIs is related to Industry Orientation and Alignment. Two generic KPIs which will further be developed in future research, are recommended:

- **Industry Alignment** = Number of Case Study Analyses per course x Time allocated per analysis / Total Course Teaching Hours in an academic term.
- **Interaction with Practitioners** = Number of Interactions per course per academic term

Construct 4: Students’ Research Outcome and Quality

Question 4: *Do you have any criteria for measuring the quality of the research work of your students? Are you interested in measuring the dissemination of their work? For example, how many research papers are published from students’ coursework?*

Construct #4 Summary of Findings – Key Quotes

<ul style="list-style-type: none"> • Yes, I would be interested in measuring the dissemination of students' work. I am currently looking for the relevant student journals that they could use to publish very good papers from their coursework.
<ul style="list-style-type: none"> • I do not have any criteria measuring the quality of my students' research work.
<ul style="list-style-type: none"> • Important criteria are appropriate use of suggested research methodology quality and appropriate use of sources of sources (updated bibliography, classic works, relevance to the specific topic, referencing/citations), concept use (terminology) and concept development, sociological relevance, application of theory, connection of research finding to relevant bibliography, organization and focus of the paper, development and clarity of argument, use of language and technical issues.
<ul style="list-style-type: none"> • We have a rubric and marking scheme that we use to evaluate students' research work. I would be interested in measuring the dissemination of their work.

Main Finding: It is evident that most respondents recognize that student research works improve the quality perceptions of course and its impact. Thus, a critical component in the proposed KPIs is related to Research Works and Depth. Two generic KPIs which will further be developed in future research, are recommended:

- **Research Works** = Number of student research works delivered per academic program
- **Research Work Depth** = Number of student works published in peer reviewed conferences

Construct 5: Engagement

Question 5: *Do you promote discussion on a given topic among students in your classroom? Are you interested in the generation of new ideas on the topic discussed coming from students? How do you balance critical thinking and knowledge transfer in your lectures? Any good recommendation, for example, 50% knowledge transfer and 50% critical thinking?*

Construct #5 Summary of Findings – Key Quotes
<ul style="list-style-type: none"> • It is difficult to balance critical thinking and knowledge on 50%-50% basis, but given the nature of our discipline, that is, philosophy, and the relevant courses, it is fundamental to combine both these two components. I try at least to have at a 40% (critical thinking) and knowledge (60%).
<ul style="list-style-type: none"> • I think there is no rule about balancing critical thinking and knowledge transfer, everything depends on the cohort, and that is the golden rule for me.
<ul style="list-style-type: none"> • Elaborating business cases serves the purpose of in-class discussion and exchange of ideas. In order critically to be gained students should have grasped theory as well as alternative interpretative frameworks. Thus, balancing knowledge and critical thinking is not a task easily accomplished.
<ul style="list-style-type: none"> • I use educational videos as the starting point of a discussion or alternatively a case study, a graph some visual asking students to interpret and elaborate on the relevant topic. • I ask students to contribute as I am presenting new material, to express their views, share experiences, and provide illustrations. Allocating about 1/3 of class time to class discussion should be appropriate.

Main Finding: It is evident that most respondents recognize that engagement of students in interactive discussions promote the quality and the impact of teaching and learning. Additionally, most respondents replied that balancing knowledge and critical thinking is not a

task easily accomplished. For this reason, we have excluded reference of the balance from the proposed KPI. Thus, a critical component in the proposed KPIs is related to Engagement. One generic KPI which will further be developed in future research, is recommended:

- **Engagement** = Documented Discussions / Total Number of 50-minute lectures per course

Construct 6: Competencies and Skills

Question 6: *Do you constantly associate learning objectives to transferable skills? Do you assign a specific number of teaching assignments to students? Can you give an example stating key elements in such an assignment? For example, in order to promote critical thinking I design the X assignment.*

Construct #6 Summary of Findings – Key Quotes
<ul style="list-style-type: none"> • In my courses, a cognitive skill in relation to problem solving is assessed through case study analysis. Students need to analyze and solve a real case, using the Harvard case study methodology.
<ul style="list-style-type: none"> • In my field that is English, learning outcomes are directly related to transferable skills. All assignments require that students exercise their critical thinking skills by unpacking layers of meaning in various types of texts.
<ul style="list-style-type: none"> • Research projects are typically connected to specific learning outcomes in my courses.
<ul style="list-style-type: none"> • Learning outcomes are directly related to skills acquisition.
<ul style="list-style-type: none"> • In my technology introductory course, students are assigned the development of a video which they share with their classmates through Blackboard. Then, based on a rubric I give them, they evaluate and rate their classmates' videos.

Main Finding: Most respondents recognize that practical and transferable skills as well as skills and competencies promote the quality and the impact of teaching and learning. Thus, a critical component in the proposed KPIs is related to Engagement. One generic KPI which will further be developed in future research, is recommended:

Recommended KPI:

- **Skillset** = Number of Intended Skills per Course / Average Class Grade per Course

Construct 7: Inter/Multi-disciplinary Character

Question 8: *What about the interdisciplinary character in the courses you teach? Can you name how many contributions from different disciplines you utilize in teaching your courses? For example, in the X course I teach, I use main contributions from four disciplines: Computer Science, Sociology, Psychology and News Media.*

Construct #7 Summary of Findings – Key Quotes
<ul style="list-style-type: none"> • The field I teach is interdisciplinary by its nature. We use concepts from different disciplines and emphasize the importance of economic, social and ecological dimensions of environmental issues. I try to present as many perspectives as possible so that students make connections with their disciplines. I ask students to reflect on how each discipline could help study a problem and help towards its solution. Information technology, math, different branches of natural sciences, social sciences (sociology, economics), law, ethics, policy making are some of the disciplines that are involved in the study of the topics I present.

- We live our lives in an interdisciplinary, multicultural and global fashion and our students should be educated like that to be successful citizens and employees. All of my classes have content from Politics, Geopolitics and Sociology.

Main Finding: It is evident that most respondents recognize that the multi/interdisciplinary character of a course promote the quality and the impact of teaching and learning. Thus, a critical component in the proposed KPIs is related to Inter/Multi-disciplinary Character. One generic KPI which will further be developed in future research, is recommended:

- **Interdisciplinary Character** = Number of Disciplines applied in teaching material in a course

Construct 8: Metrics

Question 9: *If you were asked to write down a formula for the quality in higher education what factors would you include? For example, Quality = Time Allowed for Preparation + Pedagogy + Student Engagement.*

Question 10. *Name one metric from your own perception for the quality of education in higher education. For example, "Quality Metric #1 = # of Students Passing a Course / # of Total Students Enrolled in this Course" or "Quality Metric #2 = # of Papers Presented in Conferences / # of Papers Delivered in a Course Assessment from Students".*

Construct #8 Findings

In response to question 9, interview participants have suggested different formulas for the measurement of quality (QFs), based on their teaching experience and active involvement in curriculum design and review:

- QF #1 = Time Allowed for Preparation + Scholarship/Academic Expertise + Pedagogies + Student Engagement
- QF #2= Selected Students + Meaning of Knowledge + Engagement + Dedication
- QF #3= Faculty Expertise + Pedagogies + High Academic Standards
- QF #4= Planning + Preparation + Personality + Pedagogy + Physical Environment + Assessment.

Similarly, in response to question 10, the following Quality Metrics (QMs) are suggested by interview participants and are summarized below:

- QM #1 = Papers Presented in Conferences
- QM #2: Job positions in business students get into 5 years following graduation
- QM #3: Successful teaching of transferable skills
- QM #4: Synthesis of concepts
- QM #5: Ability for independent study
- QM #6: Ability to solve problems
- QM #7: Ability to collaborate in teams
- QM #8: Number and quality of faculty publications
- QM #9: Student Satisfaction and Happiness
- QM #10: Student Engagement
- QM #11: Number of students with high/good performance in course assessments.

In the table below, nine generic KPIs deriving from the research findings are listed.

Generic KPIs	
1.	Preparation Time = Developments of the Field + Frequency of taught+ Motivation Time + Engagement Scenario + Core Knowledge
2.	Technology Infusion = (Blended + CMS) / Traditional
3.	Industry Alignment = Number of Case Study Analyses per course x Time allocated per analysis / Total Course Teaching Hours in an academic term
4.	Interaction with Practitioners = Number of Interactions per course per academic term
5.	Research Works = Number of Research works delivered per Major
6.	Research Work Depth = Number of student works published in peer reviewed conferences
7.	Engagement = Documented Discussions / Total Number of 50-minute lectures per course
8.	Skillset = Number of Intended Skills per Course / Average Class Grade per Course
9.	Interdisciplinary Character = Number of Disciplines involved in teaching material of course

Table 1. Generic KPIs

In Figure 3 below, the integrative model for the study of Quality Perceptions in Higher Education is introduced and together with the nine generic KPIs will provide the basis for future research. These KPIs will be applied to measure quality dimensions and produce quality metrics which will eventually be used by academic administrators and decision makers for quality enhancements leading to sustainability of higher education curricula.

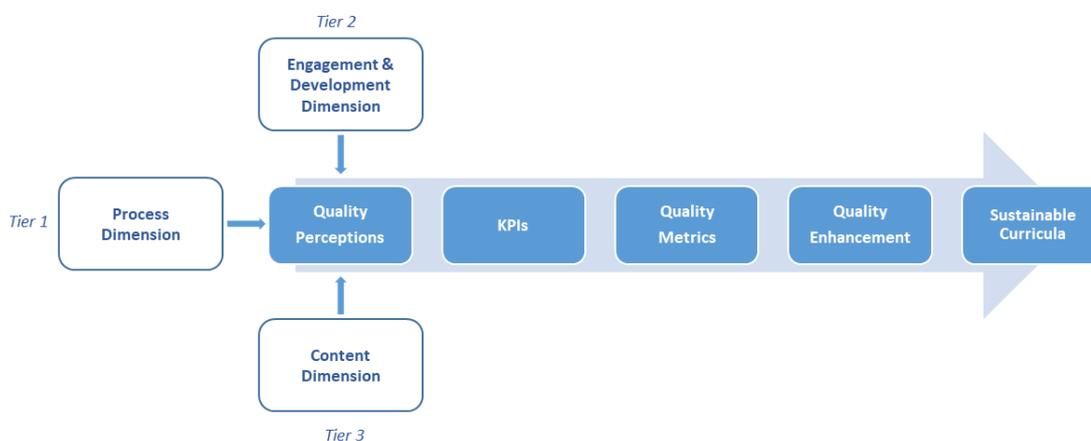


Figure 3. An integrative model for the study of Quality Perceptions in Higher Education.

5. Conclusions and outlook

Despite the common agreement among academics on the importance of quality in higher education, a consensus on its conceptualization has not been reached yet. Quality

measurements stemming from KPIs provide the basis for rethinking the curriculum and enhance the pedagogical strategies for developing sustainable higher education programs of study. According to Yarime and Tanaka [19] point of view, the content and delivery of these programs will reflect interdisciplinary systems thinking, dynamics and analysis for all majors, disciplines and professional degrees - education would have the same lateral rigor across, as the vertical rigor within, the disciplines. A key result included in the research findings, is that quality indicators could be encapsulated in KPIs to measure multiple dimensions of quality in higher education. It is in the hands of HEIs to decide when and how to thoughtfully and effectively integrate quality metrics in their systematic quality assurance processes recognizing this to achieve greater efficiency and accountability within their organization [20]. Additionally, the significance of measuring quality will make faculty – the main actors in quality assurance - realize that they are holding an instrumental and challenging role in the quality assessment process and they are not simply entities having to perform another clerical and time-consuming task.

The findings suggest the need of additional inquiry in future work especially towards two directions. First, the direction of refining and standardizing KPIs and developing a software tool for measuring them. Standardization requires further research in more European universities complying to Bologna Process, have implemented a quality assurance system and offer accredited and/or validated degrees. Second, the direction of applying quality metrics to maintain academic program sustainability. Activities for sustainability at higher education institutions should involve interdisciplinary cooperation and close collaboration with diverse stakeholders in the society. So, the plan is to continue working on designing and testing the generic KPIs developed here. According to the plan, this will be achieved through a pilot testing of the application of proposed KPIs in three undergraduate courses in Greece and Spain within year 2019. In future research, Key Performance Indicators (KPIs) will be codified in the most appropriate category as shown by the analysis performed and further discussed through in-depth interviews with Higher Education administrators and faculty to further validate them and consider measuring them. Finally, the metrics produced by the measurement of KPIs will provide the necessary intelligence to decision and policy makers towards enhancing university curricula. The latter will be a key ingredient for ensuring the sustainability of higher education institutions.

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APPENDIX A:

The structured Interview Questionnaire of Round 1:

<https://www.tandfonline.com/doi/full/10.1080/0144929X.2018.1495765> [21]

APPENDIX B:

The structured Interview Questionnaire of Round 2:
<https://www.tandfonline.com/doi/full/10.1080/0144929X.2018.1495765> [21]

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