Leadership challenges in the context of university 4.0. A thematic synthesis literature review

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Abstract

Supported by an environment that is increasingly immersed in digital transformation, universities are facing important organizational changes in both tangible and intangible structures. Digital transformation isn't all about technology, there is a human side of the story. Leadership is seen as a key issue in any process of change. However, leaders of professional and knowledge-based institutions, like universities, face special demands. The present article aims to synthesize what has been investigated about leadership in the context of University 4.0. A systematic approach was adopted in conducting the literature review. The main body of the article focuses on illustrating five thematic clusters grounded in the literature and identifying co-citation network of each cluster using bibliometrics. Results demonstrate that this is an emerging theme. This paper is the first attempt to systematically review all research that so far has been made available in the broad field of leadership in University 4.0.

Keywords University 4.0 · Digital transformation · Leadership · Literature review · Bibliometrics

1 Introduction

The digital transformation is introducing important and radical changes in higher education, leading to a new university generation: University 4.0. However, University 4.0 means much more than the use of technology for pedagogical purposes, it corresponds to a huge revolution that impacts all dimensions of the university. In such context, the interest towards leadership in higher education is growing, and the sustainability and competitiveness of educational systems in a digital society is a key topic (Minina and Mabrouk 2019). As stated by Lapteva and Efimov (2016, p. 2083), "the ongoing (or necessary) transformations of the university should be studied in the context of social transformation covering all the aspects of its existence: economic, social, cultural, anthropological". Indeed, each new generation of universities implies big changes in organizational culture and identity, thus, it requires new ways of leadership.

The present article aims to synthesize what has been investigated about leadership in the context of University 4.0. We assume that "knowledge advancement must be built on prior existing work" (Xiao and Watson 2019, p. 1). Thus, a systematic approach was adopted in conducting the literature review.

After we identify the relevant publications in either the ISI Web of Science (WOS) or Scopus (SCO) databases, two frequently used databases by researchers across various disciplines, we employ advanced clustering and mapping techniques. We applied the bibliometrics to design and visualize bibliometric maps that allow us to detect the citation network under each cluster. While identifying the current state and developing insights on leadership of University 4.0, this paper also sets the groundwork for the future research opportunities in this field.

Section 2 discusses the leadership challenges of University 4.0; section 3 presents the methodology used to conduct the systematic literature review and, in particular, the questions that have been used in the systematic search; section 4 summarizes the main outcomes, and the bibliometric and mapping exercises done on the keywords; section 5 discusses the results and identifies the gap in literature; section 6 concludes the paper and comments about research limitations and suggest a research agenda.

2 Leadership challenges of University 4.0

The accelerated process of digitalization in modern societies demands creative answers from higher education institutions. New educational technologies emerge, new skills are demanded, and the university is expected to play a new role. According to Asabin et al. (2019, p. 11), "the university becomes an environment and infrastructure platform for collective intelligence". University 4.0 is associated with the reconstruction of some core values that sustain traditional approaches used for centuries.

Lapteva and Efimov (2016) analyzed this transformation and identified the main characteristics of the university as an ideal type corresponding to a different historical era. According to the authors, if we look for a systematic analysis of the university over time, "there is a need for an ontological structure that links different aspects of reality of universities and reflects the involvement of universities in the external socio-cultural context and the internal processes occurring in the universities" (2016:2682).

Authors like Lapteva and Efimov (2016); Lukovics and Zuti (2017), and Asabin et al. (2019, p. 11) identified University 4.0 as the fourth generation in this dynamic development of higher school institutions. Based on the work of Asabin et al. (2019) and Korkmaz and Kalaycı (2019) we summarize the main characteristics of each ideal type, as it is shown in Table 1.

Many universities, all over the world, are stuck in stage 2.0, the big majority is in stage 3.0 and only few are already in stage 4.0. Digital transformation requires not only new technology but also new ways of working. Leaders, as change agents (Wallace et al. 2011), are key elements for the success of organizational changes, because they are the ones that align educational stakeholders' objectives with policy intentions. The scarcest resource in any organization is not necessarily technological know-how, but the leadership. The concept of leadership has undergone major changes over time. Early leadership approaches were much more focused on the leader's personality than on the leadership process. Since the early 1980s, transformational-transactional leadership theory has had a great influence on the research about leadership (Bass and Avolio 1994). Today's university managers need to be able to analyze a large set of digital initiatives, manage accelerating innovation cycles, and reshape the universities using new approaches.

3 Methodology

Our review can be categorized as a *Thematic synthesis* (Xiao and Watson 2019) because it examines the state of the literature of a specific topical area and uses all themes from all papers to create theme clusters. Therefore, our research question can be formulated as follows: What has been investigated about leadership in the context of the digital transformation of higher school institutions, in terms of topics, methodologies and conclusions?

Data collection took place in December 2019. We did not apply any chronological filter and we selected only "Articles" as the document type. In a first phase, we tried a separate search for each of the key word. In Web of Science Core Collection (WOS) we applied the following strategy: TOPIC: (leadership) AND TOPIC: (information technologies) AND TOPIC: ("higher education" or university). In SCOPUS we followed the same criteria. These keywords were used based on the main research themes in this area. Through an initial filter of the main articles on this theme, it was possible to reach the main keywords that guided the final research. The research was conducted in the two main databases where the journals with the most significant impact factor in the area of knowledge are located. The use of these databases makes the article more robust due to the fact that it covers more journals, of

Table 1 The evolution of higher education

	University 1.0 (Pre-industrial)	University 2.0 (Industrial phase)	University 3.0 (Post-industrial phase)	University 4.0 (Cognitive phase)
Values	Values have been stable for centuries	Values are stable for a generation	Values change during a single generation. Blurred boundaries. Networks, "teams". Social matrix combines cells of different types	Values are diversified. Society is the "world of worlds". New forms of sociality include value communities, multi sapiens, thinking networks, thinking environments
Organizational identity	–	National University	Cosmopolitan University	Open University/University 4.0
Organizational Culture	–	–	Multicultural	Multicultural
Learning	Until 1950s, education was very traditional. The student learns with the teacher, using books, notebooks, textbooks, blackboard and chalk. Teaching is in a defined physical location: the classroom	Learning is the development of knowledge through the "educational conveyer"; development of competencies through participation in research	Learning is an individual educational trajectory. Digital technologies ensure access to texts, automation of routine work, distant, individualization of education; solid communicative environment	Learning is participation in the creation of virtual realities and immersion in them; participation in the creation of new practices
Research	–	Disciplinary	Interdisciplinary	Transdisciplinary
Orientation	–	Regional, Local	International, Competitive Environment	International, Competitive Environment
Cooperation	–	With other universities (Limited)	With Industry and Government	With Industry, Government and Society
Creating	Professionals	Professionals and scientists	Professionals, scientists and entrepreneurs	professionals, Scientists, Entrepreneurs and social individuals

Source: Adapted from source: Asabin et al. (2019, p.11) and Korkmaz and Kalaycı (2019, p. 238)
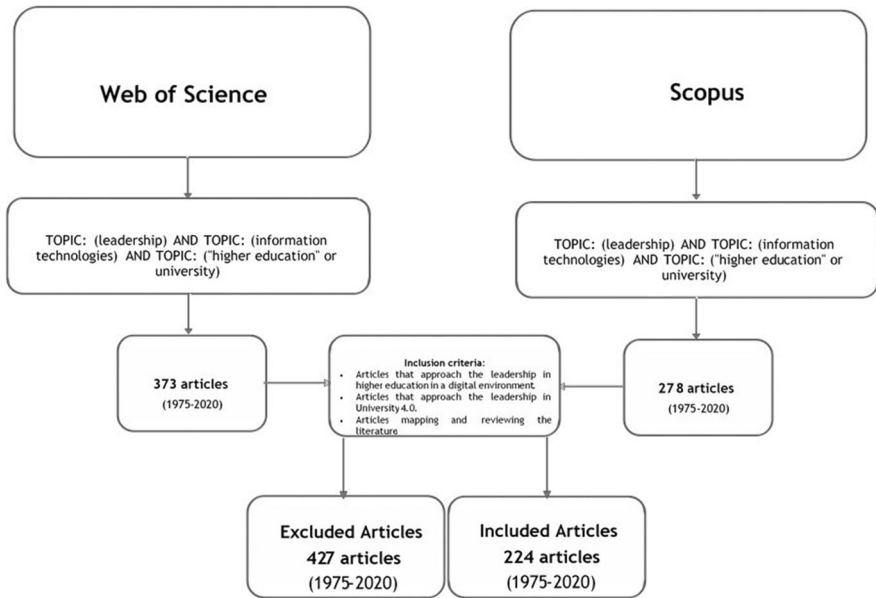
Fig. 1 Search results

greater academic importance, in this area of knowledge. In Fig. 1 we summarize the research layout and results that led to the final set of articles. The literature search yielded 651 article results, of which 101 were duplicates. Two authors reviewed and screened the titles and abstracts for inclusion and exclusion criteria. The following inclusion criteria were established: (1) Articles that approach the leadership in higher education in a digital environment; (2) Articles that approach the leadership in University 4.0; (3) Articles mapping and reviewing the literature. After this initial screening, we excluded 427 (101 were duplicates and 326 out of inclusion criteria) abstracts and conducted the first wave of full text review for the remaining 224 papers. The 224 articles that were selected in WOS and SCOPUS were published between 1981 and 2019.

We used R Bibliometrix (Aria and Cuccurullo 2017) package to perform bibliometric analysis and build data matrixes for co-citation, coupling, scientific collaboration analysis and co-word analysis and VOSviewer (van Eck and Waltman 2010) to create data clusters from analyzed articles. The use of Bibliometrix is gradually extending to all disciplines and suitable for science mapping at a time when the emphasis on empirical contributions is producing voluminous, fragmented, and controversial research streams (Aria and Cuccurullo 2017). For Network matrix creation, we used R Bibliometrix (http://www.bibliometrix.org). According to Aria and Cuccurullo (2017, p. 963), "the existence of substantial, effective statistical algorithms, access to high-quality numerical routines, and integrated data visualization tools are perhaps the strongest qualities to prefer R to other languages for scientific computation". In continuation, following the example of Aria and Cuccurullo (2017), the data were submitted to a network analysis, which was performed with the

R Bibliometrix 3.0. The next step was categorical content analysis. However, before performing this analysis, the data had to be homogenized. There are differences in the data presentation between the two databases (including period, commas, spaces between words, numbering in the authors' affiliations, etc.). Once homogenized, the data were finally submitted to bibliometric and content analysis.

Based on the 224 manuscripts' data base (title, abstract, keywords, authors, references), VOSviewer extracted 74 papers from which five clusters were created. The authors established a minimum of 20 citations in Web of Science or Scopus as inclusion criterion in the final clusters. Then, all titles, abstracts, literature review, and final considerations were read, and a document was created to contain the most relevant information extracted from those sections of each article. Finally, the contents were divided according to the main constructs in order to create a text that could provide an explanation for the main theoretical approaches to each cluster and the conclusions that had been drawn.

4 Results

First, the publication distribution is presented: namely the evolution of the number of papers, publications by author, manuscripts per citations, manuscripts co-citations network, citations per country, corresponding authors per country, and the most relevant keywords. Then, cluster designation, structure and content of the literature are presented.

4.1 Publication distribution

Analyzing all of the research outputs resulting from the articles published over the 1975–2020 periods we can see a great growth (Fig. 2). Since 2000, the number of publications has grown exponentially compared to the previous 15 years. Between 2010 and 2017, there was a significant spike in the number of publications, in relation to previous years, that reflects the underlying trend of rising academic coverage of this field (Fig. 2).
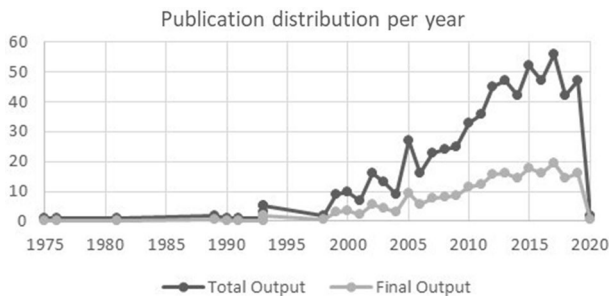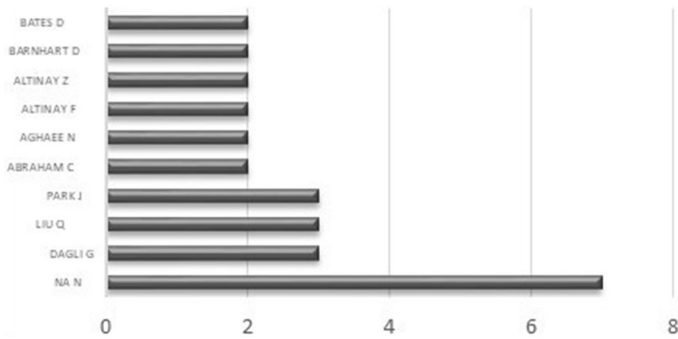

Fig. 2 Publications per Year

Fig. 3 Publications by author

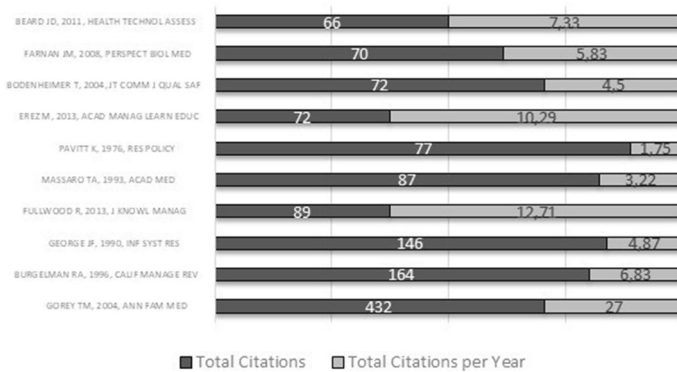In relation to the number of publications by each author, as the lead author in this

Fig. 4 Manuscripts per citations

database sample enables the verification that there are 10 authors with two or more articles published on the theme of leadership in higher education in a digital environment (Fig. 3).

Figures 4 and 5 present the 10 most cited articles according to the sum of both databases as well as a percentage of citations and co-citations network in relation to the total. These 10 articles have generated a total of 1.275 citations with average 84.33 by year. This detail demonstrates the great importance that the Top 10 articles hold in the scientific community working on this theme. In regard to the highest profile journals, we have Annals of Family Medicine, followed by California Management Review and Information System Research. These journals display high levels of the H index that corresponds to important rankings of this source by the scientific community as this evaluates the impact of articles in accordance with their number of citations.
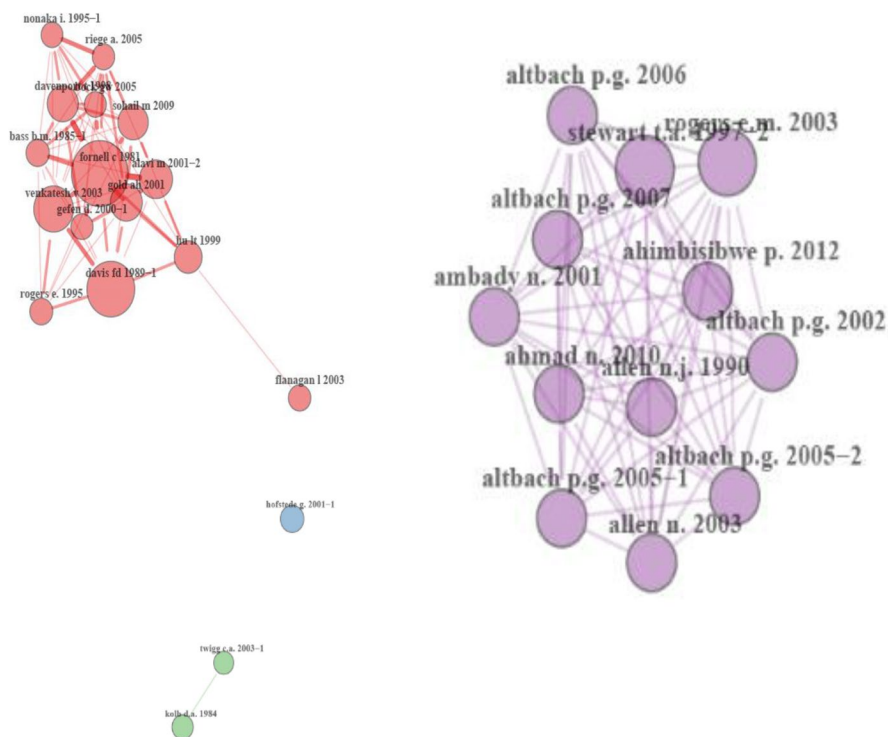
Fig. 5 Manuscripts co-citations network

Regarding the countries of origins of the authors of final articles output, we may report their nationalities as from the United States (1842 citations), the United Kingdom (579 citations) and Australia (127 citations) respectively (Fig. 6). These results demonstrate that the most relevant source of productivity on the theme under study is undoubtedly the United States, home to the scientific research that has gained the greatest recognition from its peers.

Figure 7 shows the single country publications of Top 10 from total output database, and publications from two or more authors by country. Figure 8 shows the network linking the authors' countries. In this sense we can see the USA in first place in both categories, followed by China, the United Kingdom and Australia. We realized that these countries have a great productivity both individually and co-authored. This is very relevant because in scientific research, working with networks is very important to develop new forms of expansion and evolution of scientific knowledge.

Figures 9 and 10 shows the most relevant keywords used by authors in percentage of papers from total output database. These keywords show the most important thematic research topics in this area of knowledge.

The consistency relationship between two key-words is determined by the number of articles in which said key-words are present simultaneously in the title, abstract or key-word list, in a given database.
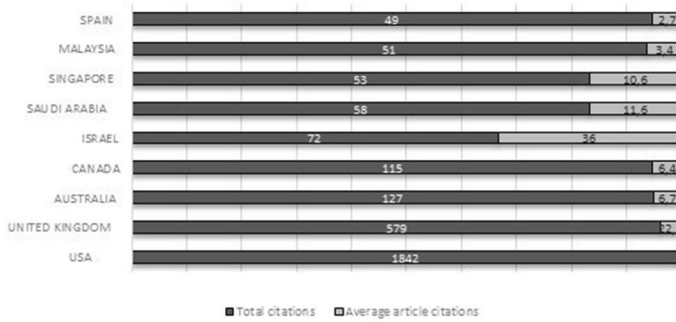
Fig. 6 Total citations per country

The co-occurrence relationship between two keywords is determined by the number
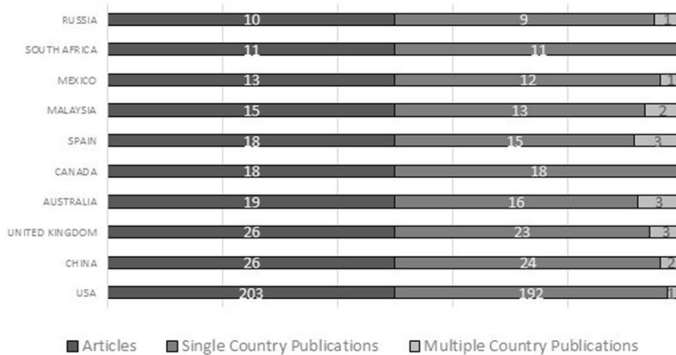
Fig. 7 Corresponding authors by country

of manuscripts in which two key-words occur together, either in the title, in the summary or in the list of keywords (van Eck and Waltman 2014).

By analysing these networks, it is possible to map search themes in the area of Leadership challenges in the context of University 4.0. The size of the node indicates the frequency of occurrence of a keyword, and the relationship between the nodes is as strong as the proximity between them.

Fig. 8 Corresponding authors' network by country

4.2 Structure and content of the literature clusters

The Bibliometrix package (Aria and Cuccurullo 2017) grouped the 74 manuscripts in 5 clusters. An integral analysis of each manuscript was carried out by at
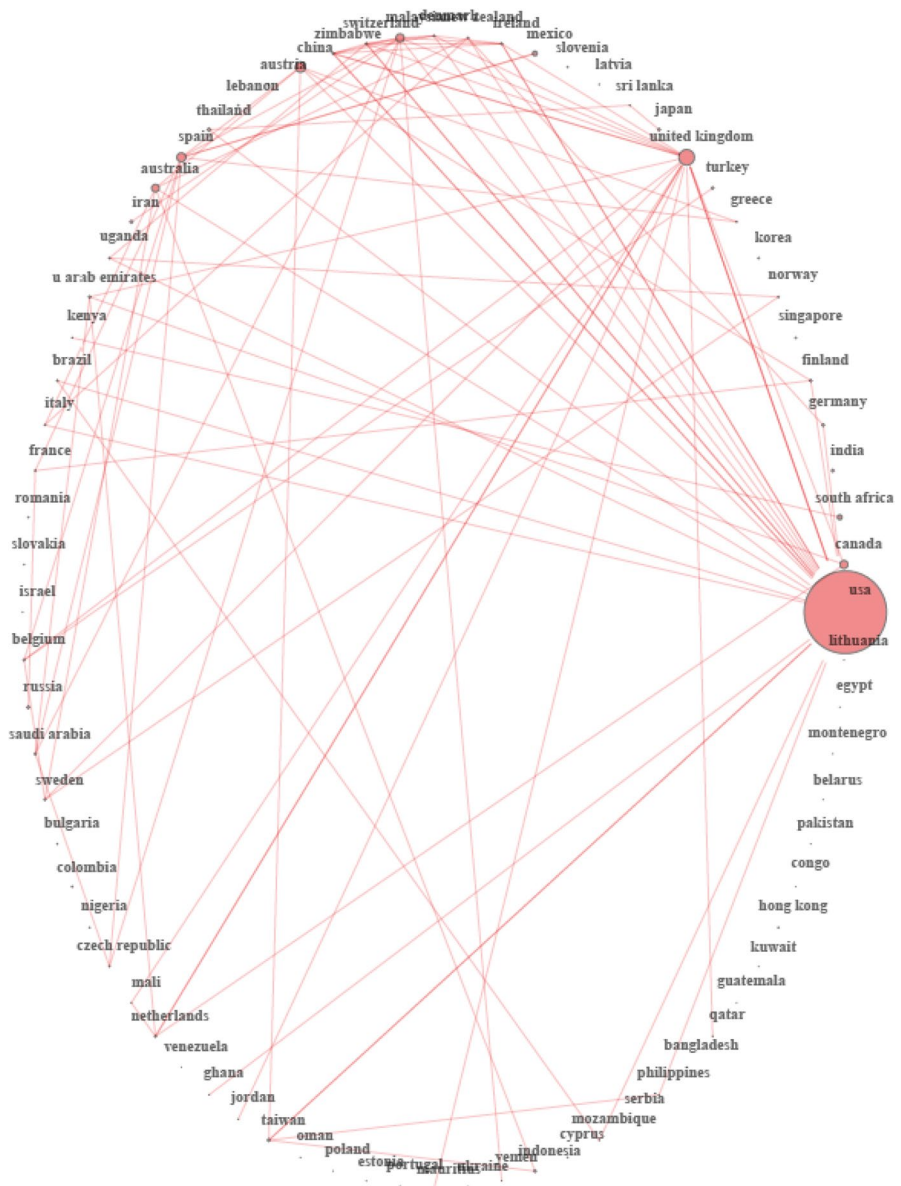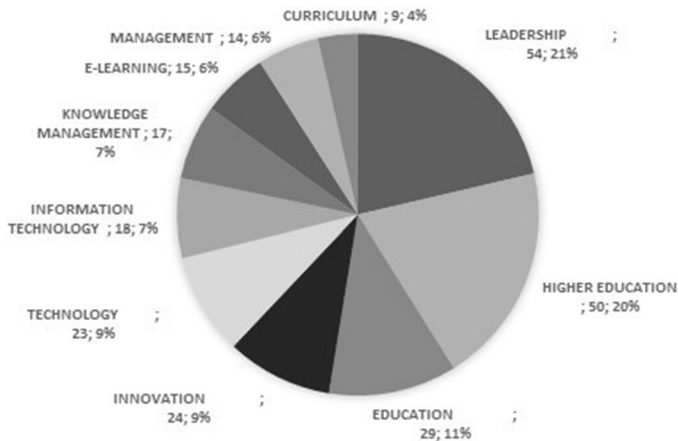
Fig. 9 Most relevant keywords

least two authors. After that, the authors discussed the focus and the main characteristic of each cluster, resulting in following synthesis:

Cluster 1—The importance of leadership in learning using ICT: The highlight of this cluster is the role of technology leadership in the classroom environment and how technology may be used to promote learning.

Cluster 2—Transformation of learning environment in higher education: This cluster aggregates several articles that address the challenges of higher education regarding the role of information technologies in the definition of management strategies and curricula. The cluster also focuses on the skills that higher education leaders must have.

Cluster 3—Factors influencing the adoption of the technology: This cluster focused on understanding the factors that can influence the use of technology and how they may be to implement strategies to increase and improve the uptake of technologies and improve the innovation adoption process in learning intuitions.

Cluster 4—Transformation of learning environment in higher education: The objective of this cluster is to present the concepts of Knowledge Sharing and Knowledge Management as important roles in private and public organizations to improve success and performance.

Cluster 5—Teaching Methods in Higher Education and its Future Impacts in professionals: This cluster focuses on the role of ICT as a partner in the educational process, stimulating and supporting the acquirement and practices of professional competences.

The reading of the papers allowed us to summarize the structure and content of the literature clusters. These clusters' main trends on the theme are displayed in the following tables in terms of objectives, methodologies and main conclusions
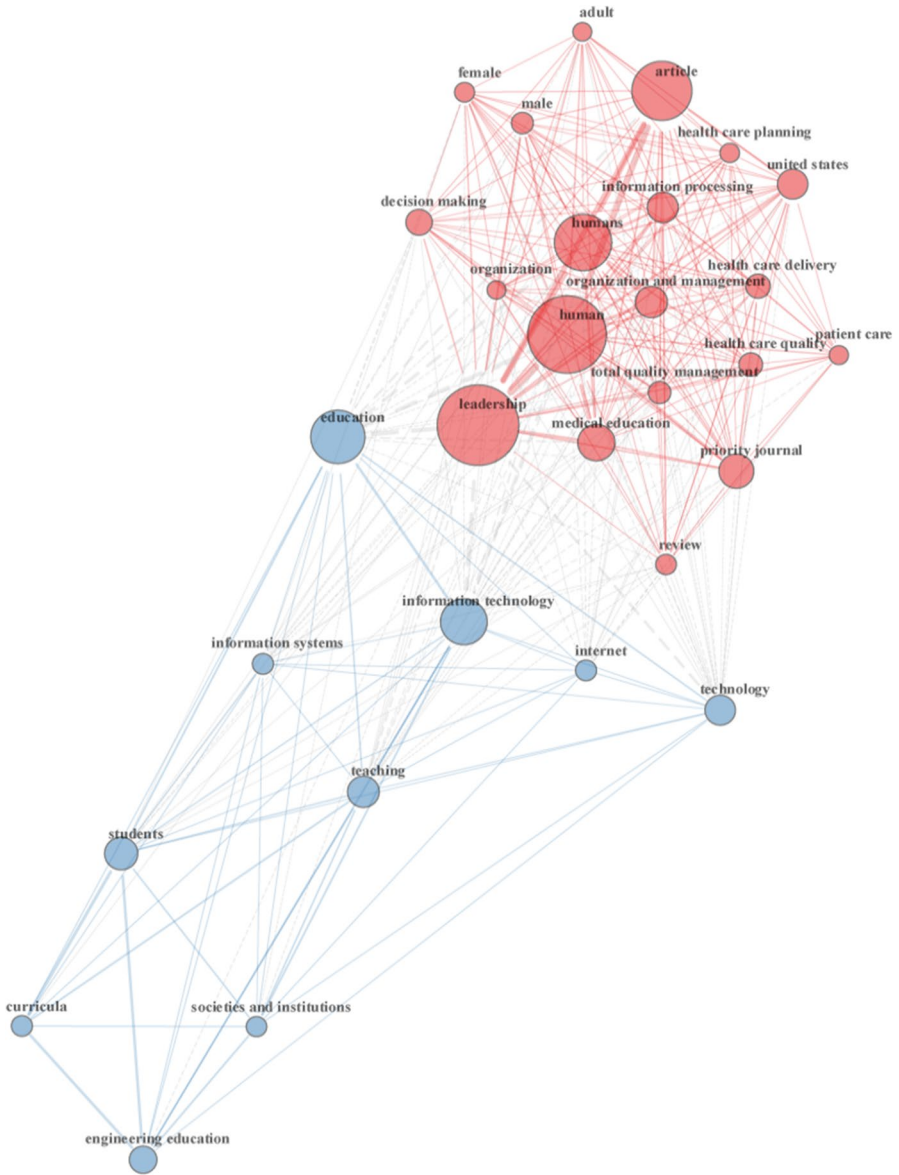
Fig. 10 Most relevant keywords network

reached by each paper, ordered chronologically. The Tables 2, 3, 4, 5 and 6 present the clusters 1, 2, 3, 4 and 5, respectively.

Technology leadership has multiple dimensions given the complexity of schools as learning organizations. It is needed for ongoing leadership professional development to deal with technology and it's major implications in high education (Jameson 2013). Although technological infrastructure is important,

Table 2 Cluster 1: The importance of leadership in learning using ICT

Article	Objective(s)	Study type	Conclusions
(Vygotsky 1978)	Edit a collection of Vygotsky's essays	Empirical	In these essays, he outlines a dialectical-materialist theory of cognitive development that anticipates much recent work in American social science. The mind, Vygotsky argues, cannot be understood in isolation from the surrounding society
(Davis 1989)	To develop and validate new scales for perceived usefulness and perceived ease of use	Empirical	Regression analyses suggest that perceived ease of use may be a causal antecedent to perceived usefulness
(Mumtaz 2000)	To associate the literature with the practice practicing teachers' uptake of ICT	Literature review	Factors which influence teachers' decisions to use ICT in the classroom: access to resources, quality of software and hardware, ease of use, incentives to change, support and collegiality in their school, school and national polices, commitment to professional learning and background in formal computer training
(Yee 2000)	To investigate the ICT leadership by considering the lived experiences	Empirical	Inherent complexity of schoolwork for students and teachers, and for principals, in ICT age
(Hofstede 2001)	To explore the differences in thinking and social action that exist between members of more than 50 modern nations Hofstede's framework, in cross-cultural business	Empirical	People carry 'mental programs' which are developed in the family in early childhood and reinforced in school and organizations, and these 'mental programs' contain a component of national culture
(Cuban 2001)	To reassess the use of computers in schools, explaining the history of computer technology in education and questioning whether the desired results occurred	Empirical	Silicon Valley schools in Cuba showed that: - less than ten percent of teachers used classroom computers at least once a week; - there was no evidence that information technology increased students' academic performance
(Cuban et al. 2001)	To know whether school facilities, hardware and software purchases, and equipment distribution will lead to abundant classroom and teacher use and better teaching and learning	Empirical	The access to equipment and software seldom led to widespread teacher and student use
(Schiller 2002)	How principals influence integration of ICT in schools	Empirical	The interventions principals make regarding ICT in their schools are significant in assisting teachers to use ICT in their classrooms

Table 2 (continued)

Article	Objective(s)	Study type	Conclusions
(Flanagan and Jacobsen 2003)	To explore the ways that the integration of technologies for teaching and learning has impacted the traditional roles and responsibilities of the school principal	Empirical	The added roles and responsibilities for principals as technology leaders require a commitment of time and resources, both for individual leaders and for school districts
(Yin 2003)	Study of the use of case study methodology in social sciences	Literature review	The case study methodology is one of the most used in qualitative research in educational research
(Yuen et al. 2003)	To analyze how schools integrate the use of ICT in teaching and learning across the school curriculum	Empirical	The strategy adopted by a school in instituting change is strongly dependent on the school leaders' vision and understanding of the role and impact of ICT in the curriculum, their goals and objectives for ICT integration
(Anderson and Dexter 2005)	Identify what kind of technology leadership attributes make a difference in the success of various technology-related programs	Empirical	Although technology infrastructure is important, technology leadership is even more necessary for effective utilization of technology in schooling
(Ertmer 2005)	To study the importance of teachers' beliefs	Literature review	Teachers' beliefs on classroom teaching present a conceptual overview of the teachers' pedagogical beliefs as a vital first step
(Hew and Brush 2007)	To identify the general barriers typically faced by K-12 schools, both in the United States and in other countries, when integrating technology into the curriculum for instructional purposes	Literature review	Knowledge gaps related with: the relationships between the first- and second-order barriers; the relationships between the strategies; the barriers and strategies associated with the different stages of technology integration by teachers; Barriers and strategies in contexts where every student is provided with a computer for use in the classroom or school

Table 2 (continued)

Article	Objective(s)	Study type	Conclusions
(Dexter 2008)	To examine leadership functions and decision making as they pertain to IT integration goals for classrooms and to IT implementation across a school	Literature review	Considering technology leadership as a school-wide characteristic rather than associating it with a particular leadership role shifts attention away from the charisma or expertise of any one individual and suggests leadership preparation for all team members
(Sun et al. 2008)	Why many users stop their online learning after their initial experience	Empirical	The results revealed that learner computer anxiety, instructor attitude toward e-Learning, e-Learning course flexibility, e-Learning course quality, perceived usefulness, perceived ease of use, and diversity in assessments are the critical factors affecting learners' perceived satisfaction
(Venkatesh and Bala 2008)	To study how managers make informed decisions about interventions that can lead to greater acceptance and effective utilization of IT	Empirical	Present a complete nomological network of the determinants of IT adoption and use—TAM3
(Inan and Lowther 2010)	To examine factors affecting teachers' integration of laptops into the classroom instruction	Empirical	Teacher level factors (readiness and beliefs) strongly predict laptop integration, Overall support for school technology and professional development have strong effects on teacher beliefs and readiness, respectively
(Bandura 2010)	To analyze over 20 years of research by the psychologist, Albert Bandura, and the ever-widening circle of related research that has emerged from Bandura's original work	Literature review	Bandura's theory should be considered by educational managers and students for a variety of reasons, not least because a teacher's sense of self-efficacy is one of the few variables that are constantly related to student achievement
(Afshari et al. 2012)	To analyze the level of computer use by principals of 30 secondary schools in Tehran, their perceived competence and their leadership style	Empirical	School principals worked on their computers a few times a week and they had moderate levels of information technology competency. Transformational leadership can help school leaders increase successful use of technology in schools

Table 2 (continued)

Article	Objective(s)	Study type	Conclusions
(Vanderlinde et al. 2012)	To study the content of school-based ICT policy plans and underlying policy processes	Empirical	Three types of ICT policy plans were identified (1) an ICT policy plan as a vision blueprint, (2) a technical inventory and (3) a comprehensive ICT policy plan
(Jameson 2013)	The development of a new fifth "age" of educational technology	Literature review	More critical, selective, strategic e-leadership approaches to the adoption and use of educational technology need to be progressed through research, development and training as the field matures

Table 3 Cluster 2: Transformation of learning environment in higher education

Article	Objective(s)	Type	Conclusions
(Rainey et al. 1976)	To compare public and private organizations and examine the publicness of organizations	Literature review	Despite virtually universal agreement among scholars that public organizations have more complex and ambiguous goals, public managers do not differ from business managers in response to survey questions about matters
(Mohan et al. 1990)	To explore the differences between public and private systems and describe an executive information system developed for a large agency	Empirical	The system is being used in different and creative ways, leading to a change in the organization's culture, with implicit and explicit impact on the focus of the organization and its measurement systems
(Ernst and others 1994)	To examine key trends impacting higher education administration and demonstrate that rather than being part of the problem, information technology is part of the solution	Literature review	New strategies are proposed to deal with changes, using information technology tools to face the challenges of higher education administration in the information age
(Jonas and others 1996)	To guide college and university business officers, from small liberal arts colleges to community colleges to research universities, through the complex set of decisions and actions associated with replacing financial management systems	Literature review	Lists the necessary steps to evaluate an institution's current hardware, network, and software; and identifies change strategies for both incremental and large-scale financial system changes
(Star and Ruhleder 1996)	To analyze the levels of infrastructural complexity involved in system access and designer-user communication of the software Worm Community System	Empirical	The mixture of close-in, long-term understanding gained by ethnography and the complex indexing, programming and transmission tasks afforded by computer science meet here, breaking traditional disciplinary boundaries and reflecting the very nature of the problem: when is an ecology of infrastructure?
(Bozeman and Kingsley 1998)	Taking a multivariate measure of "risk culture," this study seeks to identify and to explain differences between public and private organizations	Empirical	There is considerable variance in organizations' risk culture but the sector of an organization tells us little about its risk culture
(Markus et al. 2000)	To anticipate how ERP packages will evolve in the future	Literature Review	A plausible discontinuity view of the future of ERP packages. The claim is not that this scenario will transpire, but only that it could. However, if this scenario were to occur, it would have major implications for both ERP package adopters and ERP package vendors

Table 3 (continued)

Article	Objective(s)	Type	Conclusions
(McCredie 2000)	To compile several observations and recommendations about developing successful strategies not theoretical, but practical and experiential in nature	Literature Review	The main recommendations are: set a general direction and broad objectives; accept the cyclic nature of the strategy formulation process; focus on the major challenges; do not concentrate on predicting specific technological outcomes; engage a wide range of staff and constituents; get professional facilitation, but never outsource the real work; move ahead even if your parent organization has no strategic plan or process; use story telling as an important communication tool; and stay the course
(Subba Rao 2000)	To present ERP as a software solution integrating various functional spheres in an organization	Empirical	ERP is the tool for an integrated information system to stay competitive and customer-oriented for all organizations
(Rocheleau 2000)	To review, analyze, and assess prescriptions for public-sector management of IT	Empirical	Managers can institute collection of benchmark data in their organizations: conduct literature searches for traditional empirical research that pertains to their problems; search for problems and disasters that have occurred; search for best-practices literature
(Hanseth et al. 2001)	To present the definition and implementation of a corporate information infrastructure standard within Norsk Hydro	Empirical	The idea of the universal standard is an illusion. Each time one has defined a standard which is believed to be complete and coherent, during implementation one discovers that there are elements lacking or incomplete
(Dufner et al. 2002)	To investigate Strategic Information Technology Planning at the statewide level	Empirical	The executive and legislative or highest levels of state government are "not involved" in SISP
(King 2002)	To foster better decision making by conducting and disseminating research and analysis about the role and implications of information technology in higher education	Empirical	Many of higher education´s information technologies have largely succeeded in implementing new enterprise system, despite the inherent complexity of this task and, in some cases, the immaturity of the technologies implemented

Table 3 (continued)

Article	Objective(s)	Type	Conclusions
(Robey et al. 2002)	To report on a comparative case study of 13 industrial firms that implemented an ERP system	Empirical	Both strong core teams and carefully managed consulting relationships addressed configuration knowledge barriers. User training that included both technical and business processes, along with a phased implementation approach, helped firms to overcome assimilation knowledge barriers
(Rocheleau and Wu 2002)	To test the hypotheses that competition forces organizations to IT as a weapon to gain competitive advantage that makes it more likely they will view IT as more important and be willing to invest more resources in IT	Empirical	Private sector organizations do invest more resources in IT training. However, public organizations, despite the low amounts they invest in training, rate IT as important as does the private sector
(Shang and Seddon 2002)	To identify the benefits that organizations may achieve from their investment in enterprise systems	Empirical	The list of benefits is consolidated into five benefits dimensions: operational, managerial, strategic, IT infrastructure and organizational, and illustrated using perceived net benefit flow graphs
(Brown and Vessey 2003)	To study how the enterprise systems for supply chain management and customer relationship management are following in the steps of enterprise resource planning research	Empirical	Factors for successful implementation: top management engagement; project leaders experience and team members' decision capability; third parties fill gaps in expertise and transfer their knowledge; change management goes hand-in-hand with project planning; a satisficing mindset prevails
(Crawford and Rudy 2003)	To identify most pressing campus IT-related challenges	Empirical	Most pressing campus IT-related challenges are: funding challenges; administrative/ERP/Information systems; security and identity management; maintaining and upgrading network and IT infrastructure; IT strategic planning; faculty development, support, and training; web services/web-based systems; distributed learning/ teaching and learning strategies; enterprise-level portals; online student's services

Table 3 (continued)

Article	Objective(s)	Type	Conclusions
(McGredie 2003)	To present recommendations for managing IT resources in changing economic environment, especially given the significant budgetary restriction faced by most higher education institutions	Literature review	Higher education Institutions need to determine whether their long-term goals are served best by an innovator, early-adopter, or follow-the-pack approach to their information technology environment
(Ward and Hawkins 2003)	To study the role of higher education leader in IT decision making	Literature review	When higher education leaders fail to engage in IT decision-making, and fail to identity information technology as a key responsibility of functional-area executives, their colleges and universities miss countless opportunities to make strategic use of the technology, the compose makes unwise investments, and the institutional budget suffers due to IT expenditures

Table 4 Cluster 3: Factors influencing the adoption of technology

Article	Objective(s)	Type	Conclusions
(Fornell and Larcker 1981)	To study the statistical tests used in the analysis of structural equation models with unobservable variables and measurement errors	Literature Review	The present testing methods are unable to assess a model's explanatory power. To overcome these problems, the authors develop and apply a testing system based on measurements of shared variance within the structural model, measurement model, and overall model
(Davenport, By Thomas H 1998)	To address the practical realities of the knowledge management by focusing on a tangible project	Empirical	Effective knowledge management is neither panacea nor bromide, it is one of many components of good management.
(Bagozzi and Yi 1998)	To define criteria with which the structural equation models with latent variables are defined, evaluated, critiqued, and illustrated	Empirical	The present article discusses criteria for evaluating structural equation models. Various standards are defined, limitations noted, and empirical examples provided
(Hu and Bentler 1999)	To examine the adequacy of the "rules of thumb" conventional cutoff criteria and several new alternatives for various fit indexes used to evaluate model fit in practice	Literature review	For all the recommended fit indexes, except Me (a cutoff value of .90 is recommended for the ML-based Me), a cutoff criterion greater (or, for some fit indexes, smaller) than the conventional rule of thumb is required for model evaluation or selection
(Gefen et al. 2000)	To present a running example which analyzes the same dataset via three very different statistical techniques. It then intends to compare two classes of SEM and finally, the article intends to discuss linear regression models	Empirical	Editors and reviewers may want to encourage authors to use SEM tools, where appropriate. Nonetheless, as noted in this article, there are situations where SEM tools are not called for. In such cases, editors and reviewers will want to ensure that authors are not over-using the techniques, by, perhaps, choosing them for mimetic rather than for solid, technical reasons
(Alavi John and Leidner 2001)	To review and interpret knowledge and knowledge management literatures in different fields with an eye toward identifying the important areas for research	Literature review	Large and global firms' information technologies will be interlaced with organizational knowledge management strategies (KMS) and processes. Therefore, the KMS should and will receive considerable scholarly attention and will become a focal point of inquiry
(Gold et al. 2001)	To study the issue of effective knowledge management from the perspective of organizational capabilities	Empirical	Organizational capabilities are complex not only in definition, but also in operationalization

Table 4 (continued)

Article	Objective(s)	Type	Conclusions
(Lee and Choi 2003)	To develop a research model that interconnects knowledge management factors. The model includes seven enablers: collaboration, trust, learning, centralization, formalization, T-shaped skills, and information technology support	Empirical	The information technology support had a positive impact on knowledge combination only. Organizational creativity was found to be critical for improving performance; neglecting ideas can undermine a business
(Sadiq Sohail and Daud 2009)	To examine the factors and barriers that contribute to successful knowledge sharing among the university teaching staff	Empirical	As for the sample drawn from teaching staff belonging to public universities, there is a significant relationship between knowledge sharing and the independent factors mentioned earlier
(Hair et al. 2010)	To present a simplified overview of multivariate analysis and emphasize that multivariate analysis methods will increasingly influence not only the analytical aspects of research but also the design and approach to data collection for decision making and problem solving	Empirical	In this article, we learned how to complete the analysis by extending the CFA model in a way that enabled a test of the overall structural model, which includes the set of relationships showing how constructs are related to one another. SEM is not just another multivariate statistical procedure. It is a way of testing theory
(Cheung and Vogel 2013)	To explain the factors that influence the acceptance of Google Applications for collaborative learning	Empirical	Determinants of the technology acceptance model are the major factors influencing the adoption of the technology

Table 5 Cluster 4: knowledge sharing and knowledge management in public and private organizations

Article	Objective(s)	Type	Conclusions
(Davenport, By Thomas H 1998)	To explain what knowledge is	Literature review	Organizational success and failure can often depend on knowing which of them you need, which you have, and what you can and can't do with each
(Rowley 2000)	To examine the applicability of the concepts of knowledge management to higher education institutions in the United Kingdom. The intention is to identify a number of existing facilities, systems or projects which contribute to knowledge management in higher education	Empirical	The knowledge management for higher education in a global economy requires strategic alliances on an international arena, and the creation of global knowledge repositories, which are used to the competitive advantage of the partner in the alliance
(Cronin 2001)	To explore the history of 'the social' in information science and trace the influence of social scientific thinking on the development of the field's intellectual base	Literature review	The information science field has long been mindful of, and indeed receptive to, sociological thinking
(Bartol and Srivastava 2002)	To examine the role of monetary rewards in encouraging knowledge sharing in organizations	Literature review	The system of contributing knowledge to databases is the most amenable to rewards contingent on knowledge sharing behaviors
(Ipe 2003)	To examine knowledge sharing at the most basic level; namely, among individuals in organizations	Literature review	This article has presented a model that describes knowledge sharing among individuals, identifying factors that have a significant influence on the knowledge sharing process and illustrating the relationship between these factors
(Tippins 2003)	To overcome difficulties associated to the implementation of many KM processes is often difficult	Literature review	This paper identifies several barriers that inhibit KM within the college context and then presents a multi-step framework
(Bock et al. 2005)	To develop an integrative understanding of the factors supporting or inhibiting individuals' knowledge-sharing intentions	Empirical	Effective knowledge sharing cannot be forced or mandated. Firms desiring to institutionalize knowledge-sharing behaviors must foster facilitative work contexts
(Riege 2005)	To review KM and related literatures on a large number of possible knowledge-sharing barriers with the purpose of offering a more comprehensive and structured starting-point for senior managers	Literature review	The extensive list of knowledge sharing barriers provides a helpful starting point and guideline for senior managers auditing their existing practices with the aim of identifying any bottle-necks and improving on the overall effectiveness of knowledge-sharing activities

Table 5 (continued)

Article	Objective(s)	Type	Conclusions
(Gil-Garcia and Pardo 2005)	To present an analysis of a selected set of resources government practices used to guide their e-government efforts	Literature review	The analysis highlighted the particular characteristics of the guides and provided a general review of the extent to which these guides reflect current research
(Lin 2007)	To examine the role of both extrinsic (expected organizational rewards and reciprocal benefits) and intrinsic (knowledge self-efficacy and enjoyment in helping others) motivators in explaining employee knowledge sharing intentions	Empirical	The motivational factors such as reciprocal benefits, knowledge self-efficacy, and enjoyment in helping others were significantly associated with employee knowledge sharing attitudes and intentions
(Cheng et al. 2009)	To examine knowledge sharing behavior among academics	Empirical	Knowledge sharing is vital to the success of knowledge management practices in all organizations, inclusive of universities. Effective knowledge sharing is essential for the organization to benefit from the knowledge its employees have generated
(Donate and Canales 2012)	To present a novel way to conceive knowledge strategy (KS)	Empirical	The way an organization approaches knowledge management has major implications on the development of their strategy and the outcomes of KS application

Table 6 Cluster 5: teaching methods in higher education and its future impacts in professionals

Article	Objective(s)	Type	Conclusions
(Lave and Wenger 1991)	To clarify the concept of situated learning	Literature review	Learning is an integral and inseparable dimension of social practice. We have tried to encompass this new perspective under the name of legitimate peripheral participation
(Leidner and Jarvenpaa 1993)	To examine the use and outcomes of computer-based instructional technology in the context of graduate business education	Empirical	There are many potential computer-based teaching methods and the methods can have different outcomes. The use of computer-based teaching methods requiring hands on student use appear to offer an advantage over traditional methods
(Nonaka and Takeuchi 1995)	To understand why Japanese companies are so successful	Literature review	Japanese firms turned to organizational knowledge creation because of the crises they faced. They existed in an environment where they were constantly forced to abandon what was once considered successful, and where the only certainty was uncertainty itself
(Wenger et al. 2002)	To detail seven design principles for cultivating communities	Literature review	Since communities of practice are voluntary, what makes them successful over time is their ability to generate enough excitement, relevance, and value to attract and engage members for neighborhood baseball games, quiet chats, or the goal of community design is to bring out the community's own internal direction, character, and energy
(Sallis and Jones 2002)	To study the impact that effective management of knowledge can have on organizations and look at some of the practical knowledge strategies that can be employed by educational establishments	Literature review	The underlying principles of knowledge management are as applicable to education as to any other organizations, and other institutions may have much to learn from the practice of the educational sector
(Tippins 2003)	To provide fundamental principles for the design and content of two analytic display methods: (1) matrixes and (2) networks	Literature review	The display (visual format that presents information systematically so that the user can draw conclusions and take needed action) should never be monotonous
(Creswell 2003)	To stimulate students to walk through experiences, use exercises, and produce actual writing samples	Literature review	It models the types of issues that best suit different approaches and allows students to understand when to use mixed methods

Table 6 (continued)

Article	Objective(s)	Type	Conclusions
(Martin et al. 2005)	To investigate how well chemical engineering graduates perceive they were prepared for work in industry	Empirical	The following areas of weakness were also identified: work in multi-disciplinary teams, leadership, practical preparation and management skills
(Shuman et al. 2005)	To answer the question: Can the ABET professional skills be taught?	Literature review	ABET professional skills can be mastered as part of a modern engineering education format that utilizes active and cooperative learning, recognizes differences in learning styles, and is cognizant of teaching engineering in its appropriate context. It is concluded that the ABET professional skills can be evaluated

technological leadership is even more necessary for the effective use of technology in schools. The notion of cultural differences to business students is important for the application of IT. Selective, strategic e-leadership approaches to the adoption and use of educational technology need to be progressed through research, development, and training and transformational leadership can help school leaders increase the successful use of technology in schools (Kolb 2014). It was found that access to equipment and software seldom led to widespread teacher and student use. The teaching process is not exclusive to the classroom but depends also on the workplace, the family, the carpool, the community, where we come together. It is necessary to study the gaps between the knowledge and the technology (Vanderlinde et al. 2012).

It is important that Higher education defines its general direction and broad objectives, the role, and the impact of ICT curriculum. Higher education has yet to transform its core learning environment. New strategies are proposed to deal with changes, using information technology tools to face the challenges of higher education administration in the information age (McGredie 2003). Differences are found between public and private. How commitment from top management is a primary factor for Executive Information Systems success in the public sector, even more so than in the private sector. Private sector organizations do invest more resources in IT training. However, public organizations, despite the low amounts they invest in training, rate IT as important as does the private sector (Robey et al. 2002).The president or chancellor, along with the executive team, must be actively involved in defining the goals and objectives of academic campus and how these relate to key IT initiatives. Higher education leaders must possess the knowledge base, the technical competence and confidence, the courage, and the ability to communicate the strategic consequences of IT decision. This role constitutes a new definition of the executive responsibilities for leaderships in higher education. In educational research case study methodology is one of the most used in qualitative research (Ward and Hawkins 2003).

Organizational capabilities are complex not only in definition, but also in operationalization. Information technologies have been interlaced with organizational knowledge management strategies and processes. Effective knowledge management is one of many components of good management. Several studies confirmed the impact of trust on knowledge creation. The information technology support has mainly a positive impact on knowledge combination. According to results of some research, determinants of the technology acceptance model are the major factors influencing the adoption of technology. In various research on learning in higher education, several methods of data analysis are used: multivariate analysis, confirmatory factor analysis and structural equation modeling.

Knowledge Sharing (KS) and Knowledge Management (KM) play important roles in private and public organizations. They improve the effectiveness of public and private decision making and situation handling. Four public administration KS and KM areas are considered: enhance decision making within public services; aid the public to participate effectively in public decision making; build competitive societal and develop a knowledge-competitive work force (Wiig 2002). However, there is no single way of achieving business success. The concept of knowledge

management (KM) builds some management practices to improve companies performance (Chawla and Joshi 2010).

The research is about teaching methods and its impact in present and future professional life of students. Teaching methods need action because it´s fundamental that they never be monotonous (Venkatesh et al. 2003). Learning process is an integral and inseparable dimension of social practice, working in a multi-disciplinary teams, leadership, practical preparation and management skills (Lave and Wenger 1991; Martin et al. 2005). On the other hand, we can see many potential computer-based teaching methods available to obtain different outcomes, giving advantages to the students in innovative methods during the learning process (Shute and Rahimi 2017).

5 Discussion

Having defined the research protocol and the criteria adopted for inclusion and exclusion, our database searches returned a total of 304 articles spanning a time-frame ranging from 2012 to 2018 that were then subject to analysis and mapping. The result of this thorough analytical process was the production of a map featuring the leading studies, with 5 thematic clusters, in accordance with their respective levels of academic importance resulting from summing up their WOS and Scopus citations (de Sousa Borges et al. 2014). In parallel, and as the research theme so required, we also undertook the mapping of leadership application to the specific field of management irrespective of the number of citations.

We immediately noticed that there has been a substantial increase in publications over the years, motivated by the growing interest in this area of knowledge (Cheng et al. 2009), by authors from large higher education institutions with experience in this knowledge area (Shuman et al. 2005). These authors usually chose scientific journals in areas related to management and higher education studies (Sun et al. 2008).

The content analysis undertook five clusters which were found using bibliographic coupling, namely **Cluster 1—"The importance of leadership in learning using ICT"** is about technology leadership has multiple dimensions given the complexity of schools as learning organizations (Anderson and Dexter 2005; Inan and Lowther 2010). Then we found **Cluster 2—"Transformation of learning environment in higher education".** In this cluster we can find information about the importance of the definition of the general direction and broad objectives in higher education and the role and impact of ICT curriculum (Hanseth et al. 2001; Crawford and Rudy 2003). Reading the literature and analysing the software outputs we found "**Cluster 3—Factors influencing the adoption of technology".** The main topics approached in this cluster are organizational capabilities, information technologies and organizational knowledge management strategies and processes (Sadiq Sohail and Daud 2009; Cheung and Vogel 2013). We understood the importance of **Cluster 4—"Knowledge Sharing and Knowledge Management in Public and Private Organizations"** which talks about the concept of Knowledge Sharing (KS) and Knowledge Management (KM) and its great relevance in private and

public organizations (Bock et al. 2005; Donate and Canales 2012). Finally we found **Cluster 5—"Teaching Methods in Higher Education and its Future Impacts in Professionals"** which addresses the importance and influence of teaching methods and its impact in present and future professional life of students (Martin et al. 2005; Shuman et al. 2005).

The vast majority of studies in this area have been done in the USA in the first place, leading in all categories. Regarding the general conclusions from mapping the literature, we may state that leadership in universities is increasingly the object of scientific study and representing an area with great research potential that necessarily has to evolve as there are still various limitations to the existing studies, many of them lacking both in robustness and in the capacity for extrapolation to a broader reality (Vanderlinde et al. 2012).

This study systematically reviews papers about leadership, extracted from the Web of Science and from Scopus databases, using two bibliometric analyses, mapping analysis and bibliographic coupling using the software VOSviewer and R Bibliometrix. This originality study gave the possibility to systematize the literature about leadership and its application in universities, besides helping fill in its gap regarding the need to synthesize this important knowledge area, giving contribution to various studies in this field and paving the way to further research. The achievements of this paper open new avenues for other researchers, because knowledge gaps in existing research were identified, leading to future research inspirations.

This review, and the mapping of the literature, concerned with leadership effectiveness in higher education, are very interesting for future studies in this scope because we can see that, in the main paper findings, the most important information about this area of knowledge answered some questions like What?, Where? ,When? ,Who? and How? This research has been conducted around the academic world.

6 Contributions, limitations and future agenda

Leadership is an ancestral concept. However, the uncertainty and turbulence of the environment of modern organizational structures led to new ways of conceptualizing and developing strategic leadership at all levels of scale. So, it is not surprising that leadership is one of most explored subjects in the field of management. Yet, research has yielded an array of often conflicting results. Notwithstanding several efforts to integrate all the contributions and developed a comprehensive theory of leadership, "understanding the phenomenon of effective leadership is a still-unfinished task" (Kriger and Zhovtobryukh 2013, p. 412).

The main contribution of this review and mapping of the literature is now a clear chart detailing that already published on this field of knowledge. We identified the most important and relevant production about this theme, detailing the topics that have triggered the greatest level of academic interest, and providing details about leadership in academic context. Therefore, the identification of the most relevant clusters by areas and keywords studies deployed in different research studies enables other researchers to better understand this specific area. This also contributed to identifying the ways and types of leadership impact in universities environment. The main limitation of this

study was not the methodology because it was chosen carefully and with scientific method, but the literature carried out extended only to the WOS and SCO databases from the outset conditions can be criticized. However, these are the two most important databases in the world. In fact, in this type of research study, we may always call into question the quality of the keywords applied while repeating that the utilisation of other words might result in other search results and consequently another type of final output. Nevertheless, the terms applied, following various tests with other keywords but the keywords that were used revealed more robust and reliable outputs.

As would always be the case following the undertaking of scientific works resulting in the mapping and systematisation of the state of the art, we would propose further analyses of the literature applying the methodology presented here with other keywords in the databases used here and along with others to further cement the knowledge of everything hitherto achieved in this field. As this study includes only those scientific articles subjected to peer review and published in indexed journals, there would be relevance in replicating the study but taking only conference proceedings and book chapters as the outputs subject to analysis as the research option applied here was to exclude them from the scope of analysis.

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