Sustainability and entrepreneurship: Emerging opportunities for business and management education

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Abstract

Purpose: Agenda 2030 for Sustainable Development defines 17 goals with 169 targets in economic, social, and environmental fields to guarantee human rights. Universities and companies are two driving forces for achieving these Sustainable Development Goals (SDGs). In this context, university research and, specifically, business and management studies should include this new economic-social panorama. Focusing on business and management education, this study analyzes who can help to implement the SDGs, and how.

Design/methodology/approach: A descriptive examination of the evolution of documents and journals on business and management education was performed. Next, a co-authorship analysis, studying the collaboration among researchers, was performed. Finally, a co-word analysis that identifies the main topics and relationships between them was developed.

Findings: Our results suggest the necessity of expanding collaboration networks between countries and institutions. The analysis also reveals two emergent topics: entrepreneurship and sustainability. Then, three lines for teaching business and management according to the SDGs are proposed: two regarding university-firm relationships - job creation and entrepreneurship- and the third regarding universities effects on society -including sustainability principles and actions in higher education.

Originality/value: The main contribution is to show the important role that universities, in general, and business and management education, in particular, play in achieving the SDGs. Universities must mobilize their managers, professors, and students because implementing the SDGs is possible through coordinated and integrated participation.

Keywords: business, management, higher education, co-authorship analysis, co-word analysis, sustainability, entrepreneurship, SDGs.

Paper type: Research paper.

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Introduction

In September 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development, which defines 17 goals with 169 targets in economic, social, and environmental fields considering the transformation of financial, economic, and political systems to guarantee human rights. The Sustainable Development Goals (SDGs) report for 2020 presents the latest insights prior to the COVID-19 pandemic (United Nations, 2020). However, proposing and planning to achieve sustainable development does not imply that it will be implemented appropriately. Thus, knowing the roles of the different agents that will carry out actions to achieve these objectives is fundamental. Universities and companies are two such agents and are driving forces for achieving the SDGs.

Universities are one of the leading agents to achieve the SDGs because of their capacity to effect change in at least three areas: training for professionals, research, and actions to raise awareness in the university community (extra-curricular activities)(Alcaraz and Alonso, 2019; SDSN Australia/Pacific, 2017). In that context, a new global framework of Education for Sustainable Development (ESD for 2030) was adopted by the 40th UNESCO General Conference. Universities have an essential role in the achievement of the SDGs in three ways: 1) training socially responsible citizens; 2) encouraging collaborative work inside universities and research centers and with other agents; and 3) developing collaborative, multidisciplinary, and bidirectional research activities that support entrepreneurship and social innovation. Education for sustainable development, employment for SDGs implementation, capability creation, and youth engagement should be encouraged from a teaching perspective (SDSN Australia/Pacific, 2017). Companies are also essential agents for achieving the 2030 Agenda objectives. They must include the SDGs in their strategies and their most critical business activities. Firms should look for innovative solutions and create alliances to reach the SDGs effectively (Pacto Mundial Red Española, 2018).

This paper focuses on the role of universities in training future entrepreneurs and workers according to the SDGs. The current economic situation is leading to a transformation of business and management education to meet society's growing demands for responsible businesses (Adomßent *et al.*, 2014). Thus, this field has focused on teaching innovation, adaptation to the 2030 Agenda challenges, and the situation created by the pandemic. Higher education in business and management must include generic competencies related to value transmission that contribute to the training of people responsible and committed to sustainable development (SDSN Australia/Pacific, 2017).

The growing number of academic publications about education and teaching innovation in business and management confirms the interest in improving teaching in this area (e.g., Adesola *et al.*, 2019; Arbaugh *et al.*, 2009; Cebrián and García, 2015; Montoro-Sánchez *et al.*, 2012; Mora-Valentín and Ortiz-de-Urbina-Criado, 2015). In recent years, some studies have focused on applying sustainability to business and management education (Dima and Meghisan-Toma, 2018). Lee and Schaltegger (2014) highlighted the challenge for universities and business schools to develop educational models that support the acquisition of sustainability management competencies. Jabbour (2010) analyzed the contribution of business schools to environmental management knowledge, while Rusinko (2010) proposed a model that includes sustainability in management and business education. Lambrechts *et al.* (2013) analyzed the competencies for sustainable

development that are being considered in the curricula of universities in the field of business management. García-Feijoo *et al.* (2020) conducted a systematic review of the literature to identify and analyze the actions of business schools that contribute to achieving the SDGs.

Considering the role of universities in the 2030 Agenda and focusing on business and management within higher education, this study analyzes who can help to implement the SDGs and how. The study has three objectives. Among the different actors, teachers are the drivers of the changes needed to consider sustainability within the educational process. They need to develop sustainability competencies using innovative teaching and learning tools (Dima and Meghisan-Toma, 2018; UNESCO, 2017). Therefore, our first objective is to identify the main actors/agents in the business and management higher education field who can help to achieve the SDGs. For this objective, two research questions are proposed:

Research question 1: Who are the main researchers in business and management higher education that can help to achieve the SDGs?

Research question 2: What collaboration networks between researchers in business and management higher education exist that can help to achieve the SDGs?

In addition, it would be interesting to identify the themes studied in the literature and to determine whether sustainability is already present. This represents the second objective to be carried out by this analysis. Therefore, the following research question is proposed:

Research question 3: Is sustainability one of the topics being studied in the field of business and management higher education?

Finally, the third objective is to offer some ideas for improving the integration of the SDGs in business and management education. To this end, the following research question is proposed:

Research question 4: What role can business and management higher education play in the new socio-economic panorama set by the 2030 Agenda?

This paper has four sections. After this introduction, the methods and sample selection are explained. The results section answers the first, second and third research questions by way of authorship analysis and a co-word analysis that identifies the main topics and their relationships. In the discussion section, some trends, and opportunities for developing education in business and management aligned with the SDGs are proposed (fourth research question). Finally, the conclusions, limitations, and future research directions are presented.

Methods

To perform a quantitative analysis of the literature, we conducted a descriptive statistical examination, co-authorship analysis, and co-word analysis using VOSViewer (van Eck and Waltman, 2010). This software includes several tools that calculate association measurements (van Eck and Waltman, 2009) and creates clusters and maps of different networks (Waltman *et al.*, 2010).

Co-authorship analysis studies the social networks that arise from collaboration in writing academic works (Acedo *et al.*, 2006). Network vertices represent authors, institutions, or countries that have co-authored the documents in the sample (depending on the level of analysis). Two authors (institutions or countries) are related if they have co-authored one or more documents (the intensity of the relationship depends on the number of

documents). These relationships describe the social structure of a research field and answer questions about which authors (institutions or countries) play a more critical role in its development beyond research productivity data.

The co-word analysis (Callon *et al.*, 1983) allows for an understanding of the content studied in a research field and the relationships among the topics within it. In this case, the topic was the subject of the analysis. Two topics are related if they are studied in the same paper. This analysis usually employs document keywords as topics, with each keyword representing a topic. The co-occurrence of two keywords in the same document implies that these topics are related. Taking this as a point of departure and using the approach from social network theory, it is possible to build a network that shows the knowledge structure of the research field. Performing this kind of analysis requires adherence to several work phases explained in-depth by Mora-Valentín *et al.* (Mora-Valentín *et al.*, 2018).

The first task to be completed in a bibliometric analysis was sample selection. We utilized the Web of Science (WoS) database, the most used in this kind of study in the business management field (Zupic and Čater, 2015). This option may limit our coverage because WoS indexes fewer publications than alternatives such as Google Scholar. However, the use of curated databases such as WoS or Scopus has operational advantages. Although the coverage of Google Scholar is broader for certain kinds of publications, the difference in academic journals is more negligible. Finally, in many countries, the assessment of research activity is based on publications indexed in these databases, especially WoS, which encourages researchers to publish their work on them. Thus, the best research papers are typically published in indexed journals.

We worked with a single section, the Social Science Citation Index. We searched the fields "Title," "Keywords," and "Abstract" (in this database, these fields are referred to as "Topic") using the following query: ("management education" OR "management *graduat*" OR "management doctor*" OR "management phd" OR "management stud*" OR "*graduat* in management" OR "stud* in management") OR ((business) NEAR/2 (education OR *graduate* OR stud* OR docto* OR phd OR learning)). In addition, to limit our search to higher education, we added an additional restriction represented by the query (universit* OR "business school" OR "higher education" OR college), also under "Topic."

Finally, we set three additional conditions. First, we limited our search to journals included in the WoS category "Education and Educational Research." Second, we considered only articles and reviews to restrict our analysis to contrasted knowledge (Podsakoff *et al.*, 2005). Third, we limited our sample to documents published between 2010 and 2019. This query was performed on February 20, 2020. It returned 539 documents. We used Bibexcel software (Persson *et al.*, 2009) to prepare the database (cleaning, filtering, and codifying).

Results

First, we carried out a descriptive analysis of our sample to determine who (authors and their affiliation) researched this topic, when (year), and where (journal). These results are presented in the following subsections.

Evolution of documents

Figure 1 summarizes the evolution of the documents published from 2010 to 2019. There are two distinct periods in the ten years analyzed: between 2010 and 2014, we observed

that the number of documents remained constant, ranging from 30 to 40 papers per year, while since 2015, the number increased, reaching 100 documents in 2019. This evolution clearly shows an increased interest in this topic over the last five years of the analysis. We consider this differentiation in the remainder of our analysis.

Insert Fig. 1 Temporal evolution of documents.

The 539 documents included in our sample were published in 109 journals. Table 1 summarizes the number of journals based on the number of published documents.

Insert Table 1 here

Only 15 journals have published six or more articles on this topic. However, these journals account for 358 documents, that is, 66.2% of the sample. Table 2 summarizes these journals.

Insert Table 2 here

We must note the higher number of European journals in this list, especially from the United Kingdom. In addition, the top three journals have published almost 30% of the documents in the sample, considering that *The International Journal of Management Education* has only been indexed in WoS since 2017.

Authors and affiliations

Another exciting aspect is the analysis of the documents' authorship. Focusing on a purely descriptive analysis, 1319 authors participated in the writing of the 539 documents. Altogether, 1,240 of them (over 94%) authored only one contribution. Table 3 lists this statistic, and Table 4 summarizes the most productive authors.

Analyzing the affiliation of these authors, we can locate where this research is taking place. With this aim, we analyzed the country and institution of the authors. Tables 5 and 6 summarize the most productive countries and institutions, respectively.

Insert Tables 3–5 here

We observed a wide variety among the top countries, including the United Kingdom, the United States of America, and Australia. However, there was no dominant continent in the sample.

Regarding institutions (essentially universities), the prevalence of British and American universities is highlighted, although we also note the presence of Universidad Complutense de Madrid and Universidad de Granada. In the first position, we find Griffith University from Australia, one of the leading countries on this topic. In fact, in the fourth and fifth places, we also found Australian universities, while British universities occupied the second and third spots. The only exception from these nationalities in the top ten is the case of Universidad Complutense of Madrid.

Insert Table 6 here

The social structure of the field: Co-author analysis

Another interesting issue is the analysis of collaboration among the authors. Table 7 shows the distribution of documents depending on the number of signing authors. Most papers are signed by two or three co-authors, with only a few documents having five or more researchers participating. The number of articles signed by only one researcher was

slightly over 21%, so almost 80% of the documents were written in collaboration, that is, 424 papers.

Insert Table 7 here

The analysis of collaboration can be performed at different levels: Country, institution, and author. To analyze the collaboration between countries, we considered the documents signed by researchers working for institutions in two or more countries. Table 8 summarizes this information. It can be observed that this type of collaboration is limited. Researchers from only one country participated in over 77% of the collaborations. The most frequent case of collaboration between countries was with institutions from only two countries.

Insert Table 8 here

To perform the co-author analysis considering affiliation (Figure 2), we included only those countries with five or more documents (25 countries). All countries are connected within the same component except Sweden and South Africa. We distinguished four clusters (using the VOS cluster algorithm) in which we found four poles of attraction: Germany (yellow cluster), Spain (dark blue cluster), Australia (green cluster), and the pairing between the United Kingdom and the United States. All these clusters showed high geographic dispersion, especially the green cluster.

Insert Fig. 2 Co-authorship network (countries)

Following a similar approach, Table 9 and Figure 3 show the analysis at the institution level. In this case, we limited the analysis to institutions that participated in three or more documents that were included in our sample (65 institutions). Only 34 institutions were connected to the main component, while 19 were entirely disconnected from the network. In the main components, we distinguished six clusters in which Australian and British universities stand out. In addition to this main component, two other relevant groups include four and six universities. The centers of these groups are the universities of Portsmouth and Worcester, respectively, and in both cases, universities from the United States of America are included.

Insert Table 9 here

Insert Fig. 3 Co-authorship network (institutions)

We performed the same analysis at the author level, including only authors who published at least two documents in our sample (71 authors). However, we observed a very low level of repetition. The result is that the co-authorship network has a very low density. In fact, the main component of this network includes only six authors, and the remaining components are formed by two or three vertices.

Knowledge structure of the field: Co-word analysis

To determine the knowledge structure of this field, we performed an analysis of the documents' author keywords. The 539 documents contained in our sample included 1,547 different keywords. After filtering and standardization, following the recommendations of Choi *et al.* (2011), 1,231 different keywords remained. Table 10 summarizes the most frequently used keywords.

Insert Table 10 here

We limited our analysis to keywords that appeared at least four times in our database to represent only relevant topics. Moreover, we eliminated several terms because of their general meaning in the field ("business and management education," "students," "business students," "education," and "business"). These terms could be included in all the documents in the sample. Figure 4 contains the co-word analysis network and identifies seven clusters inside the main component plus another component that includes keywords related to doctoral studies.

Table 11 summarizes the main features of each cluster and includes two essential concepts to interpret their behavior: density and centrality (Callon *et al.*, 1991). Density assesses connectivity among the terms inside a cluster. A denser cluster implies a more developed topic. Centrality measures how connected a cluster is to the rest of the network. The higher the centrality of a cluster, the greater its influence on the rest of the network. In addition to these metrics, we have included some information about the number of documents in each cluster, its academic impact (citations per document and h-index), the average year of publication, and the most frequent journal for the documents containing the keywords in the cluster (a document can be in more than one group).

Insert Fig. 4 Co-word network

Insert Table 11 here

The red cluster, named "academic performance," has the largest number of keywords and documents. It is also the oldest, with the highest centrality. It is a motor cluster with solid relationships with the rest of the clusters and intense internal development.

The dark blue cluster, called "active learning," shows a low density and medium centrality and has low academic impact figures. The average publication year is one of the oldest. All these facts point to the topic's minimal development and low future potential.

The green cluster ("student engagement") has intermediate levels of centrality and density. The light blue cluster ("international students") also has a well-defined topic. Moreover, its metrics suggest a cluster with high impact (its citations per year and its h-index are high), but its low density and centrality indicate that it is a cluster with low internal development and weak connections with the rest of the network. Altogether, this indicates a low potential for this cluster in the future.

The yellow cluster, named "employability," has the highest number of citations per document and a high h-index despite its low density and centrality. The number of citations and h-index values indicate the high impact of this cluster. It is a younger group with a more recent average year of publication than the other clusters. This information suggests that it has a high potential for development in the coming years.

The purple cluster ("sustainability") shows a high density and low centrality. These figures imply a high internal development but a low connection to the rest of the clusters. Its impact has also been limited, although we have to keep in mind the youth of this cluster.

Finally, the blue group ("entrepreneurship education") is the most recent, with an average year of publication close to 2017. This affects the lower impact metrics. However, its density level suggests high internal development. In our opinion, this cluster will be the focus of interest in the coming years.

Discussion: Trends and opportunities in education in business and management

Figure 5 shows the chronology of topic trends in teaching innovation in business and management. We observe that the publication of the 2030 Agenda has encouraged research on these topics. All kinds of organizations, including universities, have shown a high degree of engagement in the quest for the SDGs.

Insert Fig. 5 Chronology of the clusters

The first topics that appear in Figure 5 are related to the internal aspects of universities and the development of the EHEA. We find two clusters that contain issues in this line: "active learning" (MacVaugh and Norton, 2012; Neriz *et al.*, 2020) and "academic performance." Topics in these clusters address the implementation of new methodologies and teaching innovations (Fernandez-Sainz *et al.*, 2016; Rienties *et al.*, 2012). In the first cluster, studies are focused on the exploration of blended methodologies such as flipped classrooms (Price and Walker, 2021) or problem-based learning (Garnjost and Brown, 2018) and approaches such as collaborative learning (Lambić *et al.*, 2018).

The "academic performance" cluster, in addition to this term, includes keywords like "higher education," "e-learning," "case-study method," and "curriculum choice." They are generic keywords with a shared link in analyzing students' performance, a transversal topic.

We observed the central role of students in the EHEA. There are two fundamental aspects of the current studies in this field: student engagement and internationalization. The "student engagement" cluster is focused on the study of factors that encourage students (Severiens *et al.*, 2015; Vuori, 2021), with particular attention to teaching/learning strategies (Escobar-Rodriguez and Monge-Lozano, 2012; Stansbie *et al.*, 2016) and classroom teaching (Hawi, 2010; Wang and Burton, 2013). The "international student" cluster covers cultural contrasts and the experience of students abroad. Interestingly, "China" is one of the most frequent keywords in this group (Bell, 2020; Yu and Moskal, 2018).

We found that the "employability" cluster has an average year of publication at the end of 2015. In addition to this keyword, this cluster contains terms such as "employment," "career choice," "work-based learning," or "industry–academia collaboration," which points to a well-defined theme for this group. We take special note of studies related to work-based learning (Jackson, 2017, 2019; Jackson and Wilton, 2017; Lee *et al.*, 2010). As mentioned previously, this topic has a high potential for development.

In 2016, we found topics related to the effect of the university on the economy and society. The "sustainability" cluster contains keywords like "education for sustainability," "SDG," "principles for responsible management education," and "corporate social responsibility." We highlight the studies of Kolb *et al.* (2017), Winfield and Ndlovu (2019), and Killian *et al.* (2019), among others.

In the "entrepreneurship education" cluster, we found terms related to "entrepreneurial intention" and "creativity." Liñán and Fayolle (2015) and Donaldson (2019) show the importance of these topics, while Nabi *et al.* (2017) suggest a plethora of research avenues in this field.

Therefore, a new path has been opened with various action lines for university studies, especially programs oriented to train future executives. In this context, universities can contribute in different ways: 1) Provide students with the knowledge, abilities, and motivation to understand and address the SDGs in the business and academic worlds; 2) empower and encourage young people to be more proactive in job creation and improve

their welfare state; 3) supply academic or vocational training to implement solutions to achieve the SDGs, especially in the business world; and 4) create more opportunities to provide students and professionals in developing countries with the capabilities to address the challenges related to the SDGs using online training that is already available in many universities (SDSN Australia/Pacific, 2017).

University studies and, specifically, the field of business and management must include the new economic–social panorama established by the 2030 Agenda while considering the severe consequences of the pandemic. We propose three lines to develop teaching in business and management including the SDGs. The first and second lines are related to the relationships that universities establish with companies, whereas the third line covers the effects of universities on society.

1. Encouragement of job creation. Universities must include sustainable development in their curricula and methodologies. In addition, they must encourage the necessary skills to implement sustainable development, promote humane values, assess students concerning sustainability, develop courses that facilitate global awareness, and include opportunities for online and lifelong learning (Iyortsuun *et al.*, 2021; Vilalta *et al.*, 2018). Two SDGs are essential for business and management studies: SDG 4 (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all) and 5 (Achieve gender equality and empower all women and girls).

2. Teaching of entrepreneurship adapted to business necessities. Universities must include the international relationship concept in all their research activities, promote research addressing the SDGs, foster social entrepreneurship, and encourage the development of capabilities and science for and with society (Ikebuaku and Dinbabo, 2018; Vilalta *et al.*, 2018). In addition, the support of entrepreneurship at universities can have positive impacts on students' entrepreneurial intention (Bernhofer and Li, 2014). In this context, there are three essential SDGs that business and management studies must include: SDG 8 (Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all), SDG 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation), and SDG 12 (Ensure sustainable consumption and production patterns).

3. Inclusion of sustainability in curriculum, content, and methodology development in the business and management disciplines. The governance structures of universities should be under sustainability principles, and all the actions at the university should consider the SDGs: green campuses, recycling campaigns, avoiding wasting energy and water, ensuring gender equality, and so on. Finally, universities must defend sustainable development, provide opportunities for dialog between interested parties, and carry out courses, programs, and research groups with other institutions in topics related to sustainable development (Vilalta *et al.*, 2018). In this case, we highlight SDG 16 (Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels).

Conclusions

This study has focused on the role that business and management education can play in the implementation of the 2030 Agenda. The results allowed us to identify the main researchers in business and management higher education who can help to achieve the SDGs (first research question). We have observed that the publication of studies in business and management education has grown over the last ten years, with only a few journals editing most of the papers. Many authors have only contributed sporadically

(94.01% only once). The most productive countries are the United Kingdom, the United States of America, Australia, and Spain. Regarding the collaboration networks between the researchers (second research question), the level was high for a young field, without consolidated research groups. Documents are usually signed by two or three authors and there is a lack of international collaboration. Since research is a collaborative activity (recent statistics show that about 10% of documents have only one author), the future requires growth in cross-border collaboration.

The results show sustainability is one of the emerging topics being studied in the field of business and management higher education (third research question). Seven well-defined thematic groups (clusters) were observed and two of them create new opportunities to develop business and management education: entrepreneurship and sustainability. In addition, three lines to develop teaching in business and management including the SDGs are proposed considering the relationships that universities establish with companies and their effects on society (fourth research question).

Finally, some general reflections on actions that can be taken by managers, professors, and students to improve the integration of the SDGs in university education have been presented. Managers must assume a proactive role in sustainable education development (Adesola *et al.*, 2019), making decisions that foster it. For example, they can include special training in sustainable development in the training plan for professors. Managers can also promote changes in regulations to consider the SDGs, change curricula, promote prizes or projects that support the SDGs, and, in short, promote every action related to sustainable development. Professors must adopt an active role, including sustainable development in their courses. They must communicate how essential the SDGs are to students, using real examples, as well as how it is possible to achieve these goals. Students must also participate in reaching the SDGs. It is essential that managers and professors provide them with information about universities' initiatives (Mustafa *et al.*, 2016; Reyes, 2016). Considering that the SDGs have an environmental, social, and economic impact, increasing students' sensitivity to this topic should not be complicated. The students' responses to these initiatives depend on their study area (Yao *et al.*, 2016). However, at a minimum, initiatives should raise student awareness of the importance of sustainability in these three facets.

The main contribution of the study is to show the important role that universities, and particularly business and management higher education have in achieving the SDGs. First, it presents a map of the main researchers and topics that have been studied in business and management education. Second, it offers some ideas for focusing business and management education on topics such as entrepreneurship and sustainable development. Third, it proposes ways for universities to integrate the SDGs in higher education.

This research has the limitation of using a single source of data (WoS) that reduces review coverage, although it guarantees that the best research papers published in the top journals are analyzed, focusing our research on these publications. This limitation may not have detected all the trends in the topic, so future studies could extend the research by considering more databases such as Scopus or Google Academic. New studies can also be conducted by applying complementary methodologies such as co-citation analysis or content analysis.

Another limitation of this study is that only one of the actors involved in implementing the SDGs is considered. Therefore, other private and public institutions' roles must also be considered when successfully implementing the SDGs. Future studies could

complement the obtained results by analyzing, for example, initiatives for sustainable development that are established through university–business cooperation.

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Tables

Table 1 Frequency of publications based on the number of documents on the topic

Number of documents published in the journal	Number of journals
1	50
2	19
3	12
4	7
5	6
6 or more	15

Table 2 Journals publishing six or more documents

Journal	Freq.	%	% acc.
International Journal of Management Education	60	11.13 %	11.13%
Academy of Management Learning & Education	49	9.09%	20.22%
Studies in Higher Education	48	8.91%	29.13%
Education and Training	28	5.19%	34.32%
International Journal of Sustainability in Higher Education	26	4.82%	39.15%
Higher Education	26	4.82%	43.97%
Journal of Hospitality Leisure Sport & Tourism Education	23	4.27%	48.24%
Teaching in Higher Education	18	3.34%	51.58%
Higher Education Research & Development	15	2.78%	54.36%
Assessment & Evaluation in Higher Education	15	2.78%	57.14%
Innovations in Education and Teaching International	14	2.60%	59.74%
Computers & Education	14	2.60%	62.34%
Journal of Higher Education Policy and Management	8	1.48%	63.82%
Revista de Educación	7	1.30%	65.12%
British Journal of Educational Technology	6	1.11%	66.23%

Table 3 Number of documents per author

Number of documents per author	Authors	%
1	1240	94,01%
2	63	4,78%
3	3	0,23%
4	12	0,91%
More than 5	1	0,08%

Table 4 The most productive authors

Author	Frequency
Jackson D.	6
Zlatkin-Troitschanskaia O.	4
Tymon A.	4
Wilkins S.	4
Schmidt S.	3
Rienties B.	3
von der Heidt T.	3
Wilton N.	3
Willcoxson L.	3
Happ R.	3
Forster M.	3
del Campo C.	3
Bordia S.	3
Bruckner S.	3
Batistic S.	3

Table 5 The most productive countries

Country	Frequency
United Kingdom	114
United States of America	108
Australia	83
Spain	48
China	39
Germany	25
Taiwan	17
Canada	16
South Africa	14
Malaysia	13
Brazil	13
The Netherlands	11

Table 6 The most productive institutions

Institution	Frequency
Griffith University	9
Open University	8
University of Portsmouth	7
Deakin University	7
Edith Cowan University	7
Universidad Complutense de Madrid	6
University of Surrey	6
Macquarie University	6
Monash University	6
Northumbria University	6

Table 7 Co-authors per document

Co-authors per document	Frequency
1	115
2	172
3	140
4	66
5 or more	46

Table 8 Countries collaborating per document

Countries collaborating	Frequency
1	327
2	75
3	18
4 or more	4

Table 9 Institutions collaborating per document

Institutions collaborating	Frequency
1	188
2	157
3	57
4 or more	22

Table 10 Keywords

Keywords	Frequency
Higher Education	75
Business and Management Education	73
Academic Performance	34
Sustainability	23
E-Learning	22
Employability	21
Students	20
Business School	19
Student Engagement	17
Education for Sustainability	15

Table 11 Cluster information

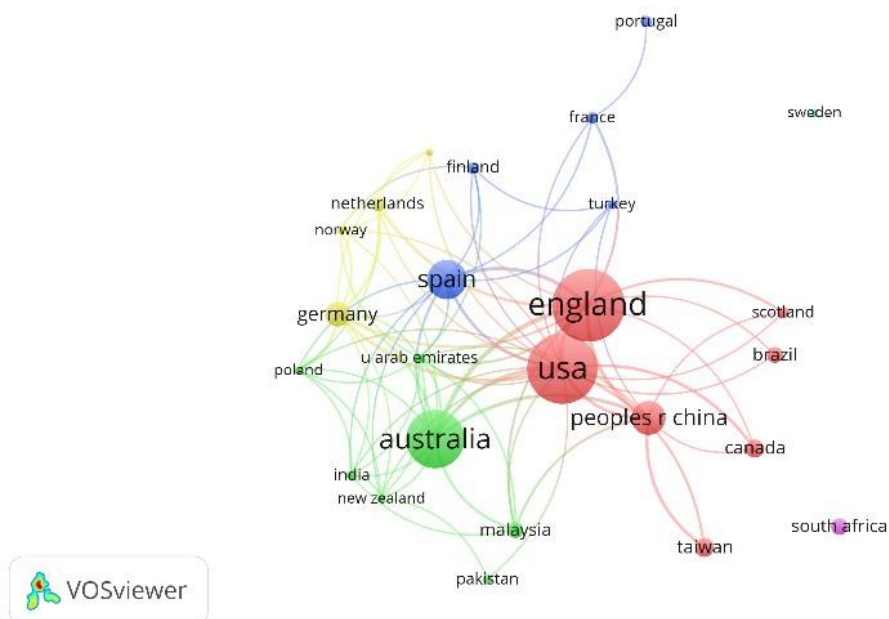| Topic	Colour	T	D	Dens	Cent	CpD	H	APY	MFJ
Academic performance	Red	11	154	5.09	197	8.35	16	2015.64	Studies in Higher Education (14%)
Active learning	Dark blue	9	52	2.89	88	7.60	10	2015.77	International Journal of Sustainability in Higher Education (15%)
Student engagement	Green	9	71	4.00	93	9.06	14	2015.79	International Journal of Management Education (17%)
Employability	Yellow	9	56	3.11	65	12.95	13	2015.96	Studies in Higher Education (20%)
Sustainability	Purple	8	65	5.50	116	8.11	11	2016.08	International Journal of Sustainability in Higher Education (34%)
International students	Light blue	8	74	2.25	59	11.45	13	2015.89	Studies in Higher Education (16%)
Entrepreneurship education	Blue	6	62	3.71	57	7.16	10	2016.69	Education and Training (18%)

Key: T – Topics; D – Documents; Dens – Density; Cent – Centrality; CpD – Citations per document; H – h-index; APY – Average Publication Year; MFJ – Most Frequent Journal
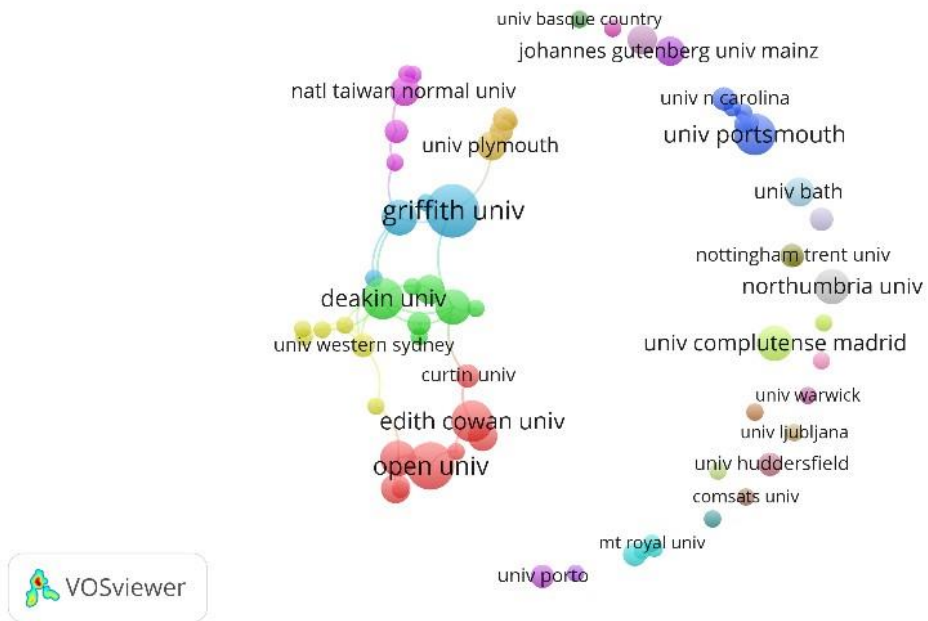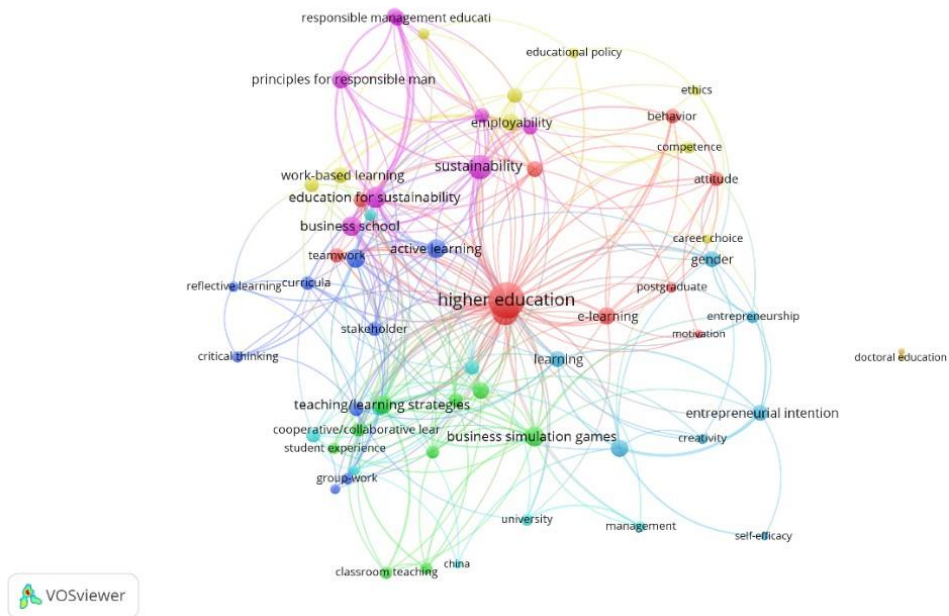
Figures

Figure 1
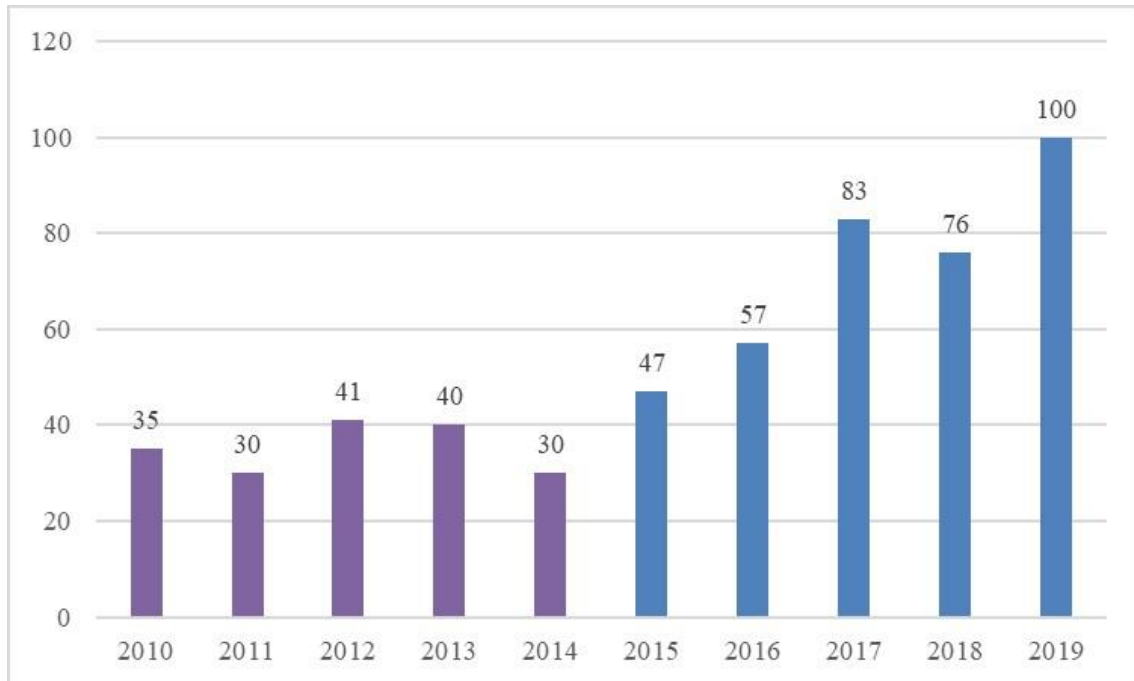
Figure 2

Figure 3

Figure 4

Figure 5