# The Employability of Chinese University's Graduates in the Knowledge Economy: Evidence from the Bibliometric Analysis and Review from 2011 to 2020

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## Abstract

Employability of graduates from higher education institutions matters not only to the career success of the individuals, but also to the growth of economies and the stability of all countries. This paper applies the bibliometric analysis and identifies the knowledge structure, main researchers, research themes, productive countries or territories, collaborating institutions, academic journals, and emerging topics of the employability of graduates. Therefore, this study is conducted by making co-authorship, co-citation and keywords co-occurrence analysis of the retrieved and pruned 1,171 references from Web of Science Core Collection during 2011-2020 with a topic research related to "employability" and "university graduates". By visualizing the data with VOSviewer, the results of this study shows that employability of college graduates is and will continue to be a research gap from the perspective of individuals, labour market and assessment, particularly in China who witnessed exponential market growth of publications in the related researches. Furthermore, transferring the graduate employability skills in the context of knowledge economy in the aftermath of the COVID-19 pandemic calls for urgent attention from the academic field.

**Keywords:** employability, university graduates, VOSviewer, bibliometric analysis, visualization, market growth, higher education institutions.

#### 1. Introduction

Over the past 40 years of Reform and Opening Up, China's national policy initiated by Deng Xiaoping in 1978, the gross enrollment rate of higher education in China has increased from 2.7% in that year to 51.6% in 2019(data released by the Ministry of Education of the People's Republic of China on May 20, 2020), surpassing the average level of middle- and high-income countries, which turns China into the world's largest country of people receiving a higher education. The economic reform in 1978 gradually shifted China's planned socialist economy to a market economy (Guo, S., & Guo, Y., 2016), which dedicated to graduates to find their own jobs in the labour market instead of being assigned to a guaranteed job position by the government. China's economic reform is a series of cumulative and overlapping reforms that promote knowledge transfer and knowledge creation, but

fail to establish a model of teaching and learning that is conducive to the development of creative thinking (Ramesh, 2013). Since economic growth is driven by technological change and innovation (Solow, 1994) and the foundation for the development of knowledge economy is talent (Zhao, 2008), China is undergoing a transitional stage of reforming its higher education because colleges and universities are the leading players in developing intellectual capital needed in the new knowledge economy (Peters, 2003).

However, in the process of the large-scale expansion of tertiary education, the supply of graduates from institutions of higher education continues to increase and the employment rate of graduates has been dropping significantly. The number of college graduates across China is at a "historically high" and every year these numbers are increasing, from 6.6 million in 2011 to 8.74 million in 2020 (MOE, 2020), which has increased about two million in the past decade.

Since the employment of college graduates has turned into a huge problem in China (Han & Liu, 2019; Jin, 2020) and around the world (Vinichenko et al. 2016; Al Nejam, 2017; Perig, et al. 2020), the

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solution is not only closely related to the interests of college students themselves, but also of great significance to social stability and economic development. Since 1990s, "employability", as an important research tool for the analysis of European and American labor market policies, has been widely used in the study of employment issues for college students (Michael, 2003; Knight & Yorke, 2003; Yorke, 2005; Moreland, 2006; Pool & Sewell, 2007; Rothwell et al. 2008; Bridgstock, 2009; Boden & Nedeva, 2010; Ingrid & Melinde, 2013; Jackson, 2016; Pinto & Ramalheira, 2017; Clarke, 2018; Tentama & Abdillah, 2019). The employability of college graduates is a collection of abilities that enable them to obtain job opportunities and succeed in their careers (Harvey, 2001). Scholars from various disciplines such as education & educational research, sociology, economics, psychology, demography, political science, etc. have conducted related research from the perspectives of definitions (Hillage & Pollard, 1998; Eby et al., 2003; Fugate, Kinicki & Ashforth, 2004), components (Mc Quaid & Lindsay, 2005; Clarke, 2018), models (Knight & Yorke, 2002; Pool & Sewell, 2007; Fugate et al. 2004), and assessment (Deeley, Cotronei-Baird, 2020). 2014; However, а bibliometric analysis of the employability of college students is rare, particularly using the evidences from China who has the largest amount of university graduates and needs to strengthen its global competitiveness in the era of knowledge economy.

This research provides insight into the research situation and trends in relation to employability of college students in the past decade. The knowledge landscape of a research field can be revealed by a network of cooperative authors, co-cited references and co-occurring keywords (Chen et al., 2014). Bibliometric methods are applied to make co-authorship, co-citation and keywords cooccurrence analysis of related references to identify the main researchers, research themes, productive countries or territories, knowledge structure, collaborating institutions, hot topics, and research clusters.

# 2. Data collection and research methods 2.1 Data collection

The Web of Science is regarded as the most authoritative indexing tool for the scientific and technical literature (Boyack et al., 2005). The data in this study was retrieved from the Web of Science Core Collection databases on October 21, 2020. The retrieval strategy is:

TS= ("employability" and "students") or TS=

("employability" and "undergraduate") or TS= ("employability" and "graduate") or TS= ("employability" and "higher education") Document types=article Timespan=2011-2020

Indexes= Science Citation Index Expand (SCIE), and Social Science Citation Index (SSCI)

2,423 articles were retrieved, and the number was refined to 1,171 after data cleansing because the synonyms to college graduates such as undergraduate and students were searched to obtain more comprehensive data source, which inevitability led to many repeated articles in the research result.

## 2.2 Research method

VOSviewer (Leiden University, Leiden, Netherlands) is a profession tool for creating maps in various knowledge fields based on the principle of co-citation and coupling of literature (Van & Waltman, 2010). It has been developed actively since 2009 and applied in bibliometric mapping in various disciplines (Williams, 2020). In this study, VOSviewer 1.6.13 was used for analyzing and visualizing co-authorship of authors, institutions and countries or territories, co-citation of authors and journals, and co-occurrence of keywords.

#### 3. Results and discussion

#### **3.1** Publication information

The publications on employability of college graduates have been constantly increasing in each year since 2011(shown in Figure 1). The total number of articles reached 221 in 2020, quadrupling the amount in 2011, which shows that employability in higher education is a hot research topic with growing popularity.

Based on the cited times from Web of Science Core Collection, the 1,171 papers in this research have been cited 9, 425 times, and the top 10 most frequently cited papers are listed in Table 1. All of them have been quoted more than 100 times except for Assari's "Unequal gain of equal resources across racial groups" by the end of October 21, 2020. Tymon's article is cited 193 times, which wins the first place in the references and implies its importance in this field. It reveals that sufficient studies have been done from the perspectives of government, employers, higher education institutions and graduates, but little attention has been paid to the undergraduates who are receiving the employability training courses. Tymon suggests that higher education institutions could raise awareness of employability from a broader sense and engage students with skills development

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activities and work-based training programs, firstand second-year students in particular (Tymon, 2013). Jackson's paper is quoted 159 times as the second most influential literature. By investigating classroom and placement activities that develop employability and factors that influence performance, he finds that students' experiences are in line with the principles for work-integrated learning programs and problems in performance during placement are mostly caused by the poor design of the programs (Jackson, 2015). The paper by Tomlinson in 2012 is cited 149 times, which reviews the major empirical and theoretical studies in the field of graduate employment, and considers a wider understanding of employability than the one regulated by policymakers (Tomlinson, 2012).



Figure 1. Number of	publ	lications i	n each	i year	trom	2011 t	0 2020
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Year	Cited frequency	Title	Author(s)	Journal
2013	193	The student perspective on employability	Tymon, A	Studies in Higher Education
2015	159	Employability skill development in work- integrated learning: barriers and best practice	Jackson, D	Studies in Higher Education
2012	149	Graduate employability: a review of conceptual and empirical themes	Tomlinson, M	Higher Education Policy
2013	140	Competing perspectives on graduate employability: possession, position or process?	Holmes, L	Studies in Higher Education
2016	125	How economic, humanitarian, and religious concerns shape European attitudes toward asylum seekers	Bansak, K Hainmueller, J Hangartner, D	Science
2011	109	Do employability skills really matter in the UK graduate labour market? The case of business and management graduates	Wilton, N	Work Employment and Society
2011	106	Graduate identity and employability	Hinchliffe, Gw Jolly, A	British Educational Research Journal
2013	103	The effects of online professional development on higher education teachers' beliefs and intentions towards learning facilitation and technology	Rienties, B Brouwer, N Lygo-Baker, S	Teaching and Teacher Education
2012	102	The impact of work placements on skills development and labour market outcomes for business and management graduates	Wilton, N	Studies in Higher Education
2018	93	Unequal gain of equal resources across racial groups	Assari, S	International Journal of Health Policy and Management

Table 1. Top 10 highly cited papers	
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### 3.2 Authorship

The retrieved 1,171 papers are composed by 2,887 authors and those who have contributed more than four articles are listed in Table 2. The top 23 most productive authors published 144 papers, only accounting for 13.3% of the total amount. The leading author is Jackson, D, with 26 publications

Table 2. Top 23 most productive authors

through the decade. It is also shown that he is the most co-cited scholar by other researchers (Figure 2). His major research interest is work-integrated learning, employment, identity, generic skills/attributes and career success, followed by Coetzee, M, whose research focuses mainly are employability attributes, graduateness, and positive psychology.

Ranking	Author	Publications	Ranking	Author	Publications
1	Jackson, D	26	13	Hill, C	4
2	Coetzee, M	11	14	Oliver, B	4
3	Bennett, D	8	15	Thompson, Cd	4
4	Creed, Pa	7	16	Wilton, N	4
5	Pavlin, S	7	17	Sin, C	4
6	Tholen, G	7	18	Knight, E	4
7	Peng, Myp	7	19	Dezelan, T	4
8	Tomlinson, M	7	20	De St Jorre, Tj	4
9	Bridgstock, R	6	21	Tymon, A	4
10	Baruch, Y	5	22	Hill, J	4
11	Smith, C	5	23	Smith, S	4
12	Tran, Lt	4			





#### 3.3 Countries or territories

87 countries or territories contribute the 1,171 papers in this research. Table 3 lists the top 18 most productive countries or territories with more than 20 publications in the past ten years, among which England, Australia, Spain and USA contribute more

than 100 academic articles respectively. The top 5 most prolific countries or territories are all developed except for Peoples' Republic of China who is seeing more related studies each year (Figure 3). There was only one article by Chinese researcher in 2011, but the publications rise up to

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22 in 2020. It is evident that employability will continue to be a research hotspot in Peoples' Republic of China to tackle the growing pressure of graduate employment.

Almost all countries or territories have cooperated with the USA and England (Figure 4). The node in Figure 4 refers to a country or territory, and nodes in the same cluster are marked with the same color, which indicates a common research focus. It shows that countries or territories often cooperate for a major cluster, and each cluster usually has a major contributor that can be seen by the size of the nodes. VOSviewer groups the countries or territories with over ten publications into seven clusters. Cluster #1: Australia, Malaysia, New Zealand, People's R China, Taiwan and USA; Cluster #2: Denmark, France, Italy, Poland, Romania, Spain; Cluster #3: Chile, Finland, Netherlands, Sweden; Cluster #4: Canada, India and Wales; Cluster #5: Ireland, Portugal and Scotland; Cluster #6: England and South Africa; Cluster #7: Germany and Slovenia.

Table	3.	Тор	18	most	productive	countries	or
territo	orie	S					

Ranking	Country or territory	Publications
1	England	324
2	Australia	209
3	Spain	113
4	USA	100
5	Peoples R China	59
6	Scotland	34
7	South Africa	33
8	Italy	33
9	Portugal	29
10	Wales	26
11	Malaysia	25
12	Taiwan	25
13	Germany	25
14	Finland	25
15	Canada	24
16	Netherlands	24
17	Sweden	23
18	India	22



Figure 3. The publications by researchers from People's Republic of China in each year between 2011 and 2020



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## 3.4 Journals

The publications of academic articles related to employability of college students in the top 20 journals are shown in the Table 4. Most of the top 20 journals are in the category of education and educational research, higher education in particular. It is clear that "Studies in Higher Education", "Education and Training", "Higher Education Research & Development" and "Higher Education" are crucial in the field of graduate employability with over 40 publications in the past decade. Other journals with over 20 publications such as "Sustainability", "Journal of Geography in Higher Education", "Teaching in Higher Education" and "Journal of Higher Education Policy and Management" are also major contributors in this area.

The size of the nodes in the co-cited journal map (Figure 5) indicates the number of citations received by the journal, and the distance between the nodes signifies the co-citation frequency of the journal (Chen & Liu, 2020). The map reveals that the top three most co-cited journals are "Studies in Higher Education", "Journal of Vocational Behavior" and "Higher Education Research & Development", which are also on the list of the top 20 most productive journals in the studied period. Analysis of journal co-citation helps identify the distribution of academic sources of employability research and the collaboration between the journals.

Table 4. Top 20 most productive journals					
Ranking	Journal	Publications			
1	Studies in Higher Education	78			
2	Education and Training	59			
3	Higher Education Research & Development	43			
4	Higher Education	40			
5	Sustainability	30			
6	Journal of Geography in Higher Education	29			
7	Journal of Hospitality, Leisure Sport & Tourism Education	22			
8	Teaching in Higher Education	20			
9	Journal of Higher Education Policy and Management	20			
10	Journal of Studies in International Education	14			
11	Journal of Vocational Behavior	13			
12	Active Learning in Higher Education	13			
13	Assessment & Evaluation in Higher Education	12			
14	International Journal of Engineering Education	11			
15	British Educational Research Journal	11			
16	British Journal of Sociology of Education	11			
17	Frontiers in Psychology	11			
18	Career Development International	10			
19	Higher Education Policy	10			
20	International Journal of Manpower	10			



Figure 5. Journal co-citation map of graduate employability from 2011 to 2020

#### 3.5 Institutions

Table 5 shows the top 18 most prolific institutions with more than 10 publications in the studied period. It is noticeable that all of these universities are from Australia and England. The former reaches to as many as 10 institutions, and the latter 8. To be more specific, the top six institutions, Edith Cowan University contributing 30 papers, followed by Monash University and Griffith University (21), Deakin University (19), University Queensland (16) and Curtin University (14), are all from Australia.

There are cooperative networks between these institutions (Figure 6), which can be grouped into four major clusters (Table 6). Cluster #0 includes Edith Cowan University, Griffith University, University Southampton, University Plymouth and University West England, which focuses on workintegrated learning, Australia, identity, and generic skills. Cluster #1 includes Monash University, University Queensland, La Trobe University, University Warwick and University Melbourne, focusing on graduate, assessment, transferable skills and curriculum. Cluster #2 includes Deakin Queensland University, Curtin University, University Technology and Rmit University, which concentrates on international education, workintegrated learning, student engagement and

graduate attributes. Cluster #3 includes University Nottingham, University Birmingham, University Portsmouth and Coventry University that prioritizes on entrepreneurship, business and sport management.

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Ranking	Name of Institutions	Frequency
1	Edith Cowan University	30
2	Monash University	21
3	Griffith University	21
4	Deakin University	19
5	University Queensland	16
6	Curtin University	14
7	University Nottingham	14
8	Queensland University Technology	13
9	University Birmingham	12
10	University Southampton	12
11	Rmit University	11
12	University Portsmouth	11
13	La Trobe University	10
14	University Plymouth	10
15	University Warwick	10
16	Coventry University	10
17	University West England	10
18	University Melbourne	10



Figure 6. Cluster map of institutions

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Table 6. <b>Centrali</b>	y and cluster	of institutions
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Institutions	Degree centrality	Betweenness centrality	<b>Closeness centrality</b>	Cluster
Edith Cowan University	8	0.434471289	0.566666667	0
Griffith University	1	0	0.369565217	0
University Southampton	2	0.115703782	0.459459459	0
University Plymouth	1	0	0.283333333	0
University West England	2	0.117647059	0.386363636	0
Monash University	7	0.175332633	0.566666667	1
University Queensland	5	0.118329832	0.515151515	1
La Trobe University	4	0.164443277	0.472222222	1
University Warwick	3	0.045220588	0.447368421	1
University Melbourne	5	0.041001401	0.472222222	1
Deakin University	5	0.036292017	0.472222222	2
Curtin University	5	0.049702381	0.472222222	2
Queensland University Technology	2	0.00245098	0.37777778	2
Rmit University	3	0	0.404761905	2
University Nottingham	3	0.019432773	0.34	3
University Birmingham	2	0	0.293103448	3
University Portsmouth	4	0.137027311	0.425	3
Coventry University	4	0.138532913	0.395348837	3

#### 3.6 Keywords

Keywords can offer core information of the retrieved articles. Table 7 lists the top 25 keywords through 2011 to 2020. Besides the topic words "employability" and "graduate", the most frequent keyword is "employment", followed bv employability skills, education, skills, labour market, curriculum, graduate attributes, etc. Figure 7 shows that the top 10 keywords vary in each year, but they keep appearing through the selected 10 years and remain the hot research topics. The top 2 keywords have been employability and graduate constantly, but the keyword at the third place has been shifting between competences, employment, education and employability skills.

The keyword co-occurrence map (Figure 8) generates 47 nods and 3 clusters. Each cluster reflects a hot research topic and indicates the efforts made by the scholars in the studied period.

Comprising of 23 items, Cluster 1 mainly focuses on the employability from the perspective of individuals. It explores how gender, academic performance, education, self-efficacy, sustainability, career development, training and work-integrated learning impact the employability.

Cluster 2 includes 12 items and sheds light on the employability from the perspective of labour market. It mainly discusses the relationship between generic skills, employment skills, transferable skills, work placement and employment.

There are also 12 items in Cluster 3 that mainly

studies the assessment of employability. It tries to find out that employability can be evaluated from the aspects of career, competences, employers, skills, internship and graduate attributes.

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Ranking	Keyword	Frequency
1	Employability	381
2	Graduate	258
3	Employment	49
4	Employability Skills	38
5	Graduate Employability	33
6	Education	32
7	Skills	29
8	Labour Market	26
9	Curriculum	25
10	Graduate Attributes	24
11	Work-Integrated Learning	23
12	Perceived Employability	23
14	Students	16
15	Gender	15
16	Soft Skills	15
17	Human Capital	15
18	Experiential Learning	15
19	Assessment	14
20	Career Development	14
21	Generic Skills	14
22	University	14
23	Internships	13
24	Employers	13
25	Work Experience	13



Figure 7. Top 10 keywords in each year from 2011 to 2020



Figure 8. Co-occurrence map of highly frequent keywords

#### 4. Conclusion

This paper made a visual and bibliometric review of graduate employability based on the academic articles retrieved from Web of Science from 2011 to 2020. It finds that employability of college students is still a research hotspot with increasing publications in each year. From the perspective of contributors, at the micro level(authors), the most productive authors are Jackson, D, Coetzee, M, and Bennett, D, and the most cited authors are Jackson, D and Tomlinson, M. At the meso-level (organization), all of the top 18 most prolific institutions are from Australia and England and the top six are all from Australia. Based on the cooperation between the organizations, they can be divided into four clusters that have different research priorities within each cluster. At the macro-level (countries or territories), more than 100 academic articles are published by researchers from England, Australia, Spain and USA respectively. In the meanwhile, England and USA play a crucial role in the collaborative network of countries or territories because they are the biggest nods with most links on the cluster map. As the only developing country in the top 5 most productive nations, PR China, whose publications increased by more than 20 times from 2011 to 2020, is seeing exponential growth in the research of graduate employability due to the growing domestic employment pressures.

In terms of journals, "Studies in Higher Education", "Education and Training", "Higher Education Research & Development" and "Higher Education" ranks top three in publishing related articles in the field of employability studies. While "Studies in Higher Education", "Journal of Vocational Behavior" and "Higher Education Research & Development" are the top three most co-cited journals. It is notable that most of contributing journals are in the field of education and educational research.

Research themes are mainly employment, employability skills, education, skills, labour market, curriculum, and graduate attributes. The co-occurrence of keywords reveals three major research hotspots, employability from the perspective of individuals, employability from the perspective of labour market and assessment of employability. Each hot topic has attracted researchers of different nationalities from various disciplines to study graduate employability with similar interest.

The research findings provide an insight and valuable information for researchers to understand the research status in the employability of college graduates and identify new potential collaborations, hot topics and research trends. Due to the global economic instability caused by the COVID-19 pandemic, the recent graduates are largely facing the pain of unemployment currently and the pressure of job hunting in the future (Crayne, 2020). As a result, more research is urgently needed in transferring the employability skills of college graduates in the buoyant knowledge economy in times of the COVID-19

pandemic. Although some meaningful results have been obtained through the visual and bibliometric analysis of graduate employability-related articles in this research, two main limitations should be marked in the future studies. First, all the articles in this study are written in English, which leads to a linguistic bias of data in other languages. Second, the data retrieved from Web of Science covers the most important articles in the field of employability, but the source is not comprehensive and some potentially useful journals may be excluded.

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