

Exploring the Effects of Future Technological Skills on Students' Achievement: A Bibliometric Analysis

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Abstract

Humanity is facing global technological, social, and educational transformations, which has forced educators and educational policy leaders to define future skills for students' success in school, life and work. Therefore, educational institutions must realize the role of these skills in improving academic achievement and integrating them into the curricula. Therefore, this research comprehensively examines future skills and students' achievement by conducting a bibliometric analysis. This study expanded all research from 2007 to 2021 by utilizing the similarities visualization software (Vosviewer). A sum of 2433 publications were analyzed as documented in the Scopus database in August 2022, identifying the most compelling subjects covered by the journal. Findings demonstrate several significant research concerns (Basic skills, learning skills (4CS), technical skills and social skills. Several emerging topics have been identified (critical thinking skills, leadership). The research presents a roadmap for potential researchers, concentrating on critical areas where success is possible.

Keywords: Future Skills, Academic Achievement, Students, Learning, Bibliometric Analysis.

Introduction

The world is witnessing rapid changes in all aspects of life, and these changes are directly reflected in the educational process. With the emergence of the information and technological revolution in the world, and the production of the Fourth Industrial Revolution and its attendant important technologies, forecasting the skills of the future has become the biggest challenge in all countries of the world in this era. Therefore, it is imperative that those in charge of developing educational systems consider the inclusion of future skills in an

integrated and continuous manner in the educational process (Ministry of Education, Singapore, 2015). Future skills are defined as a set of skills necessary to ensure learners' readiness for learning, life and work, and the optimal use of information, media, and technology in the future (Dieguez, 2021), and the literature is unanimous like (Partnership, 2015) that future skills include three sets of skills, which are basic skills such as reading, writing and arithmetic, and applied skills such as creativity. Critical thinking, social and leadership skills, and technical skills such as information and communication technology.

Academic achievement is closely related to cognitive skills, which are components of those three sets of future skills. The results of the study (Kan'an, 2018) showed that the use of future skills was an important indicator of students' achievement in science, and a study (Wibowo, 2021) which followed the quasi-experimental approach that the students in the experimental group have a higher level of achievement in the skills that consist of critical thinking, cooperation, communication, and creativity, which are the components of future skills compared to the control group.

Consequently, this research quantitatively analyses Exploring future skills role in students' achievement published between (2007–2021) to examine the research landscape comprehensively, particularly future skills using Bibliometrics analysis. Bibliometrics analysis is a statistical method for quantifying and assessing the number of rising trends in a specific study area (AlShehhi et al., 2022a; AlShehhi et al., 2022b; Hao et al., 2018; Mustapha et al., 2021 Mamman et al., 2017; Mamman et al., 2022; Abuhassna & Yahaya, 2018; Abuhassna et al., 2022b; Abuhassna et al., 2022a; Abuhassna & Awae, 2021; Abuhassna et al., 2022). Bibliometrics analysis was used to cover the field of Social Studies and Computer, and Arts Which is related to Exploring future skills role in students' achievement (Prahani, 2021; Qureshi, 2021). For instance, based upon 2433 Publications that were gathered from the Web of Science (WoS) (Rodriguez-Garcia, 2019; Rocha, 2019).

The importance of analysing the studies in this article is to clarify the role of educational institutions' use of future skills in raising the levels of academic achievement for students, which may benefit both teachers in raising the level of achievement of their students, and curriculum planners at the Ministry of Education in developing the content of educational curricula, which contributes to Drawing up educational policies related to this field (Dieguez, 2021).

For this purpose, the objectives of this study are to analyse future skills and students' achievement in Scopus by using bibliometrics and visualization analysis. Moreover, in the current study, all data have been collected from Scopus, the world's leading abstract and citation database of peer-reviewed research. Therefore, this research data included many leading journals in future skills and students' achievement. This analysis allowed us to see how the research interests of future skills and students' achievement have been altered over time. Additionally, this research visualized and investigated the scientific collaborations among top contributors in future skills and students' achievement that were unavailable in prior studies. Exclusively, we intended to answer the following research questions

1. What is the distribution of future skills and achievement publications by years for the last decade?
2. What are the most relevant Journals and authors in future skills and achievement research?
3. What are the most productive countries in future skills and achievement research area?
4. What are the primary research keywords for the last decade of future skills and achievement?

Material and Methods

This review aimed to reveal the most prolific studies carried on future skills and achievement area. To achieve this bibliometric analysis review was conducted in this study. This research was conducted on 28th august 2022. Scopus data base was used in this search. The initial search revealed 2433 articles in future skills and achievement research area. The keywords that were used (skills, future and achievement). This research covered the last 15 years from 2007 to 2021. For the other process, subjects are selected for the current study, Social Sciences, Computer, Art. Finally the research language used only articles published in English language excluded any other languages. Moreover, the final articles used in this review were 1001 articles in future skills and achievement research area.

The Bibliometric Analysis

This research utilized a bibliometric analysis using VOS viewer, which is one of the most common used software in the area of bibliometric analysis.

This review is being carried out based on the following purposes. First, future skills has evolved into a compelling research area with growing research numbers.

Thus, it is required to investigate the thematic structure of such a study area by utilizing an accurate machine learning method that could spontaneously examine sizeable, documented literature data. Then, the current research is being carried out to help provide insights concerning what has been discussed and the trends in future skills, Figure 1 shows analytic framework of the study.

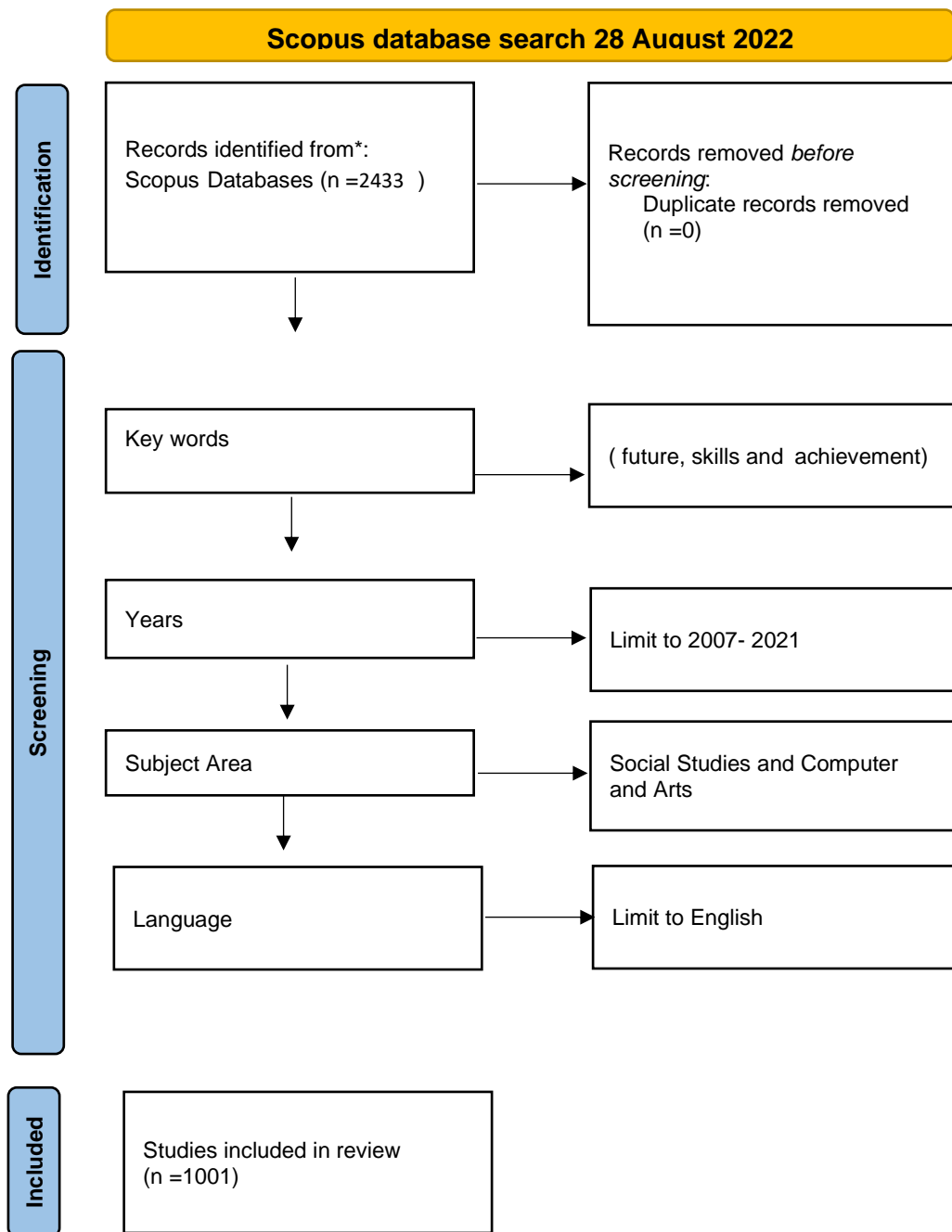


Fig. 1. Analytic framework of the study

Findings

The study aims to Exploring future skills role in students achievement. The findings of this review were discussed based on the research questions.

Research Question 1

1. What is the distribution of future skills and achievement publications by years for the last decade?

To address the first finding, an analysis was conducted of the publication year

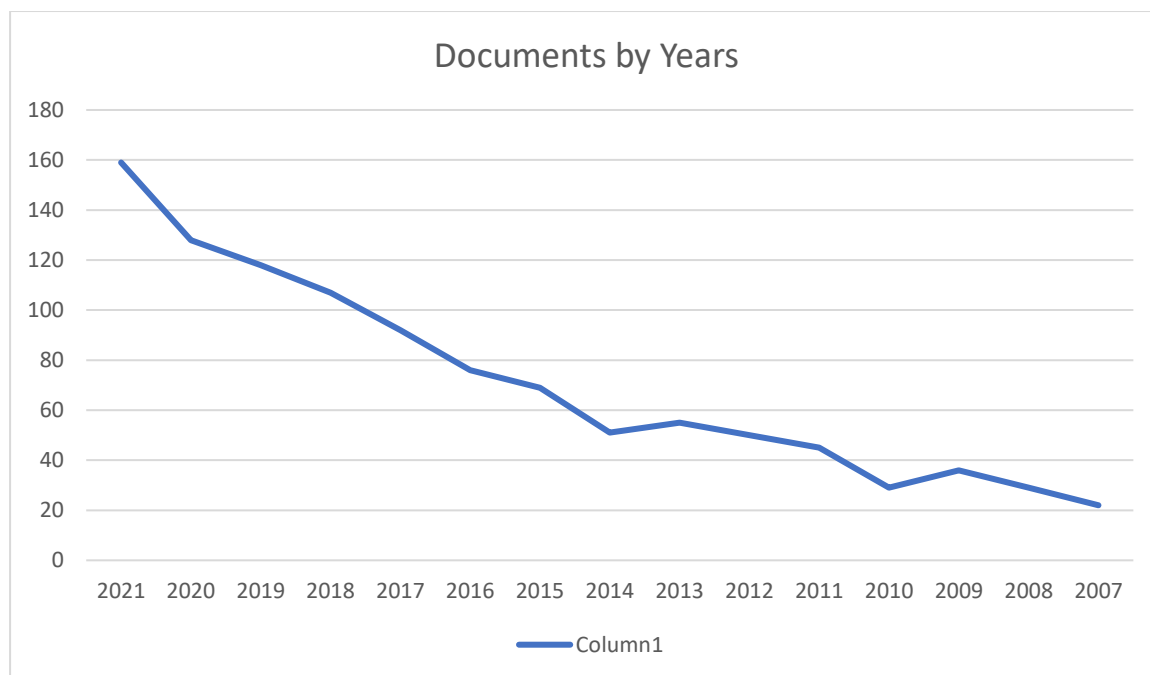


Fig. 2. Number of studies by years

Figure 2 shows the significantly growing number of papers from 2007 to 2021 in scopus databases, such as the year 2021 contributing the highest number with 159, and 128 documents in 2020, while in 2007 22 articles published in the same topic.

Research Question 2

2. What are the most relevant Journals and authors in future skills and achievement? In the content analysis made for the most cited journals, "Total Publication," "Total Citation," "Cite Score of the journal," "The most cited article," "Times cited," and "Publisher" was chosen as the analysis criteria as presented in Table 1.

Table 1

Top 10 SOURCES journals in : future skills and achievement in the years (2007–2021)

Journal	TP	TC	Cite score	The most cited article	Times cited	Publisher
Journal of Surgical Education	978	4296	4.4	Effect of COVID-19 on Surgical Training Across the United States	89	Elsevier
BMC Medical Education	1901	7103	3.7	Effects of the COVID-19 pandemic on medical students: a multicenter quantitative study	57	Springer Nature
Sustainability	36485	181699	5	Plant growth promoting rhizobacteria	127	MDP

				(Pgpr) as green bioinoculants		
Early Childhood Research Quarterly	450	2786	6.2	Null relations between CLASS scores and gains in children's language, math, and executive function skills	26	Elsevier
Journal of Educational Psychology	313	3125	10	Immersive virtual reality increases liking but not learning with a science simulation and generative learning strategies promote learning in immersive virtual reality	47	APA
ACM International Conference Proceeding Series	44179	44929	1	Findings of Shared Task on Offensive Language Identification in Tamil and Malayalam	25	ACM
Psychology in the Schools	439	1109	2.5	Training paraprofessionals who work with students with intellectual and developmental disabilities: What does the research say?	15	Wiley-Blackwell
Computers and Education	822	16299	19.8	Comparative analysis of Student's live online learning readiness during the coronavirus (COVID-19) pandemic in the higher education sector	84	Elsevier

Learning and Individual Differences	396	2390	6	Autonomy support predicts language mindsets: Implications for developing communicative competence and willingness to communicate in EFL classrooms	17	Elsevier
Teachers College Record	444	975	2.2	Advancing an ecological approach to chronic absenteeism: Evidence from detroit	4	Teachers College Record

TP= Total publications, TC= total citations,

Table 1 shows that the most productive journal concerning future skills and achievement was “Journal of Surgical Education” with a total publications number 978, and a total citation of 4296, followed by “BMC Medical Education ” with a total publications number 1901, and a total citation of 7103, in addition to “Sustainability” with a total publications number 36485, and a total citation of 181699. Moreover, the distribution of the most productive journals concerning future skills and achievement is presented accordingly in Table 2.

On the other hand, RQ2 also investigated the most prolific authors in the future skills and achievement area. In the content analysis made for the prolific authors in the future skills and achievement area, “Author,” “Total Publications,” “h-index,” “Total citations,” “current affiliation,” and “country” were chosen as the analysis criteria as shown in Table 3.

Research Question 3

3. What are the most productive countries in future skills and achievement area?

To address the first finding, an analysis was conducted of the publication countries.

In the content analysis made for the most productive countries in the future skills and achievement area, “country,” “Total Publications,” “and “most productive academic institution” were chosen as the analysis criteria as shown in Table 4 and Figure 3.

Table 2

List of the 10 most productive countries in the future skills and achievement area

Rank	Country	Most Productive Academic Institution	TP
1	USA	Indiana State University	363
2	UK	University of Oxford	82
3	AUSTRALIA	James Cook University	63
4	Canada	McGill University	38
5	Germany	Illinois State University	35
6	Russian Federation	Petersburg Polytechnic University	31
7	Malaysia	Universiti Sains Malaysia	28
8	Span	Universidad de Málaga	27
9	Turkey	Middle East Technical University	27
10	Chiana	Wuhan University	24

Note: TP = Total Publications

Table 2 and Figure 3 show the most 15 productive countries in the future skills and achievement area illustrate the topic distributions of the top prolific countries/ regions and establishments. From a country standpoint, most of the listed countries/ regions demonstrated a stable interest in all the research matters relating to online learning. In contrast, various countries/ regions showed a specific interest in specific trends.

For example, the most productive country was the “united states,” with a total number of publications of 363 within the Indiana State University. They were followed by “United Kingdom” with a total number of publications of 82, within University of Oxford, and followed by “AUSTRALIA” with a total number of publications of 63, within the James Cook University. Moreover, other prolific, productive countries in future skills and achievement area data were presented in Table 3.

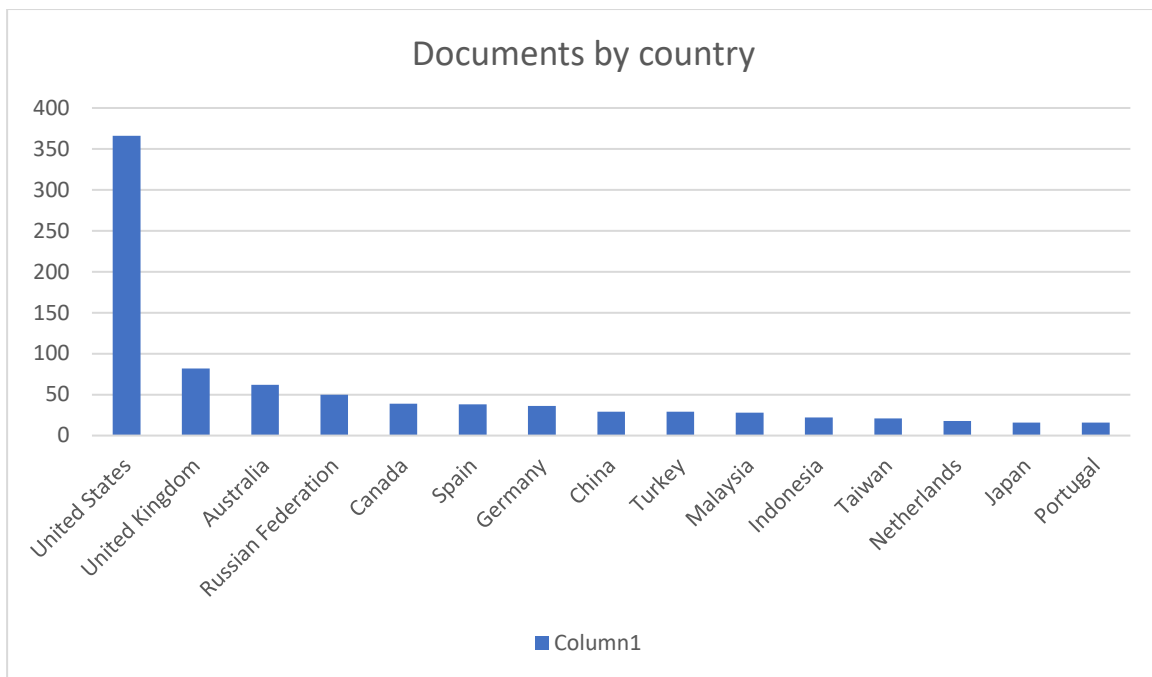


Fig. 3. Country and research field base Publication

Fig. 3 shows the countries and fields base publication starting from 2007 until 2021. The figure shows that in United States 366 articles published, and 82 at most in other countries in the topic of future skills and achievement, which shows the an increase in the rate of publication in the United States in this field of research.

Research question 4

4. What are the primary research keywords for the last decade of future skills and achievement? For the bibliometric analysis of the most used keywords, “Co-occurrence” was selected as the analysis type, and “Authors keywords” was marked as the unit. In this context, 400 keywords have been identified from the data set, as shown in Figure 4.

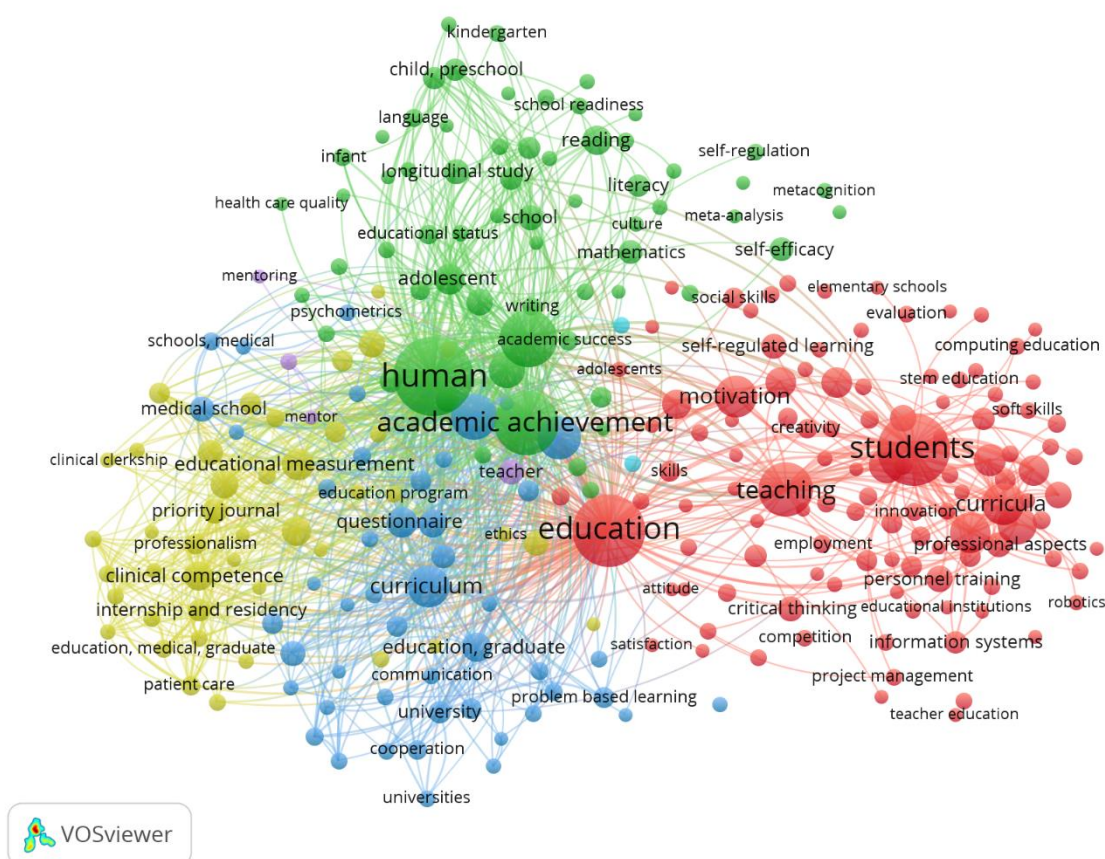


Fig. 4. Analysis results of publications by keywords

When Figure 4 is examined, the keywords used in the studies listed as “students” (Occurrences “Oc” = 135), “Academic achievement” (Oc = 106), “learning” (Oc = 48), “E-learning” (Oc = 41), “leadership” (Oc = 17) and “Critical thinking” (Oc = 16). These were followed by Social skills, creativity, communication, and collaboration. When the keywords of the publications are examined, it is seen that approximately 82% (n = 330) use words such as achievement and learning. In addition, those keywords such as Social skills, creativity, communication, and collaboration are less preferred in bibliometric analysis.

Discussions

According to the 2433 research publications gathered from the Scopus database, this research review presents an overview of future skills and students achievement review utilizing content analysis and bibliometrics. This trend analysis of research review reveals an increasing interest in future skills and students achievement research as a promising field of study. Such an analysis of the publishing sources indicates that future skills and students achievement is mainly welcomed by educational fields that focus on the relationship of future skills and their effects on students achievement. (See Figure 6).. (See Figure 5).

Countries Distributions

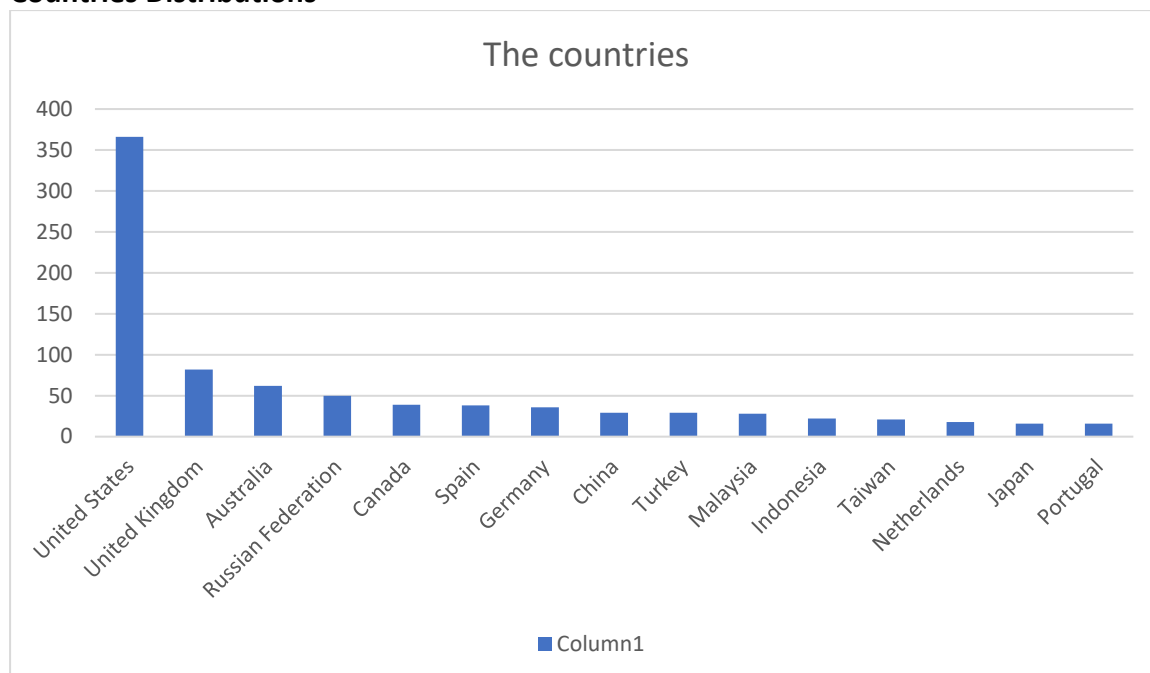


Fig. 5. Country distribution and total publications

The USA has contributed to roughly 15% of the analyzed literature, with Indiana State University being the most productive educational institute. Moreover, Scientific cooperation analysis shows that countries/regions (e.g., the USA, UK, Australia, and Russia) presenting more interest in global cooperation are likely to evolve faster. Additionally, the collaborations among the same institutions or regions are much more significant. This study has identified the most related research topic in future skills and students achievement. These topics include (Basic learning skills, practical skills such as 4CS skills, and technical skills), Furthermore, the current study also illustrates that the most tendencies and trends in future skills and students achievement research area, And that the basic skills are determined by three skills which are reading, writing and arithmetic, the applied skills are also divided into the four skills of learning (4cs) such as creativity, critical thinking, cooperation and communication, and addition to soft skills such as leadership and adaptability, while technical skills branch into ICT skills and dealing with data, information, and media.

Conclusion and Implications

Global initiatives have been launched by educational organizations and institutions that have tried to identify the skills that students will need to succeed in the future, and how to integrate it into the educational curricula, Academic achievement is one of the main indicators of student success in school, the job market, and life, as a result of their teach them this skills. To detect the research topics and their dynamics in the future skills and students achievement area, this paper conducts analyses in 2433 future skills and achievement publications using bibliometrics and content analysis. The distribution of the annual number of future skills and achievement publications reflects this research field's dramatically increasing interest. Such active research on future skills and achievement indicates a promising future development trend. Interdisciplinary journals focusing on the connection between the future skills and students achievement are involved in future skills and achievement. Indiana State University was the most productive country and institution

publishing future skills and achievement. International collaborations can contribute to better scientific performance. Phrases such as “future skills,” “achievement learning,” “leadership,” “Social skills,” and “technical skills” are commonly used and mentioned in future skills and achievement publications. Predominant research topics include technology integration, the basic skills, and the applied skills. Most subjects, including critical thinking, creativity, students’ achievements, cooperation, communication, and adaptability, have received significantly increasing attention from scholars devoted to the future skills and achievement.

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