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Lifelong Education in Economics, Business and Management Research: Literature Review

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Abstract

Background: Lifelong education includes formal and nonformal forms of learning during an individual's life cycle for the conscious and continuous development of one's quality and the quality of life in society. **Objectives:** The goal of the research is to identify the most frequent research topics related to lifelong education in economics, business, and management research using a systematic literature review. **Methods/Approach:** The study analysed 272 lifelong education papers in Business, Management, and Economics journals using bibliometric analysis, text mining, and Provalis Wordstat content analysis, identifying frequent journals, authors, nations, and funding entities. **Results:** Research on lifelong education, focusing on older adults, critical thinking, quality of life, poverty reduction, professional training, and human capital, is primarily published in the International Journal of Lifelong Education. Four clusters have been identified. **Conclusions:** The number of lifelong education papers is increasing, primarily published in educational journals. The most common keywords highlight its focus on human capital, supporting economic and social development.

Keywords: lifelong education, bibliometric analysis, topic mining, economic and business, cluster analysis

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Introduction

In an ever-evolving global economy, the dynamics of formal education have steadily expanded beyond traditional classroom boundaries (Moore, 2015). Lifelong education, encompassing both formal and nonformal avenues of learning, has emerged as an essential paradigm in ensuring the continuous and deliberate development of individual capabilities and, by extension, the betterment of society (Nylander et al., 2022). Such a form of education is no longer seen as an enrichment activity but rather as a necessity, especially in fields such as economics, business, and management, characterised by rapid changes and innovations (Waller et al., 2020). Given its significance, a comprehensive understanding of the thematic focuses within lifelong education research in these areas is paramount.

This paper delves into a systematic literature review of lifelong education studies within Business, Management, and Economics, unearthing trends, leading contributors, and central topics. Through rigorous methods of bibliometric analysis, text mining, and topic mining, we aim to provide an encompassing landscape of the field and underline its crucial role in shaping contemporary economic and social structures. This research sets out to discern the predominant research themes associated with lifelong education in economics, business, and management, applying a systematic literature review approach.

Our methodology pivots on a comprehensive exploration of the Web of Knowledge database. With a focus on "lifelong education" as the primary keyword, the search was tailored exclusively to scientific journals under Business, Management, and Economics. This refined search yielded a pool of 272 pertinent papers. A rigorous bibliometric analysis was subsequently executed on this collection, mapping out the recurrence of specific journals, prominent authors, contributing nations, and the institutions that funded the research. Furthermore, examining the most cited papers within this collection offered a deeper insight into the influential works in this niche. Text mining techniques were employed to extrapolate the recurrent research themes, illuminating the most frequent keywords, phrases, and overarching topics. The analytical tool, Provalis Wordstat (Provalis, 2022), facilitated a robust content analysis, identifying clusters representing recurrent phrases and terms, especially within paper titles, abstracts, and keyword sections.

In the paper, the introduction outlines the significance of lifelong education across disciplines, emphasising its growing relevance in economics, business, and management. The methodology section details the approach taken, including the refined search on the Web of Knowledge and the ensuing analytical techniques employed. A bibliometric analysis is conducted to map out the prevalent journals, authors, nations, and funding institutions involved in lifelong education research. The paper investigates frequent keywords, phrases, and overarching topics through text mining, further delving into a granular analysis of the word and phrase frequencies. Conclusively, the paper emphasises the intersection of lifelong education with human capital development and its pivotal role in steering economic and societal advancement.

Methodology

This chapter provides an overview of previous research on lifelong education. First, the search strategy of scientific databases and the analysis procedure of the found articles are explained, and then the bibliometric analysis of the articles is presented.

Finally, the most common research topics related to lifelong education were identified.

Searching the literature of scientific databases on lifelong education for this work began with identifying relevant databases. As a result, the focus is on works indexed and cited in the scientific databases Web of Science and Scopus (AlRyalat et al., 2019). The mentioned two scientific databases were selected as relevant for the literature search process because they are widely used in various literature searches as a reliable source of review articles (Nguyen-Duc et al., 2015). In addition to the above, the two mentioned scientific databases are the most extensive and contain the most relevant publications, and both databases are most often used for literature review (Aghaei Chadegani et al., 2013). Moreover, Aghaei Chadegani et al. (2013) explain that the Web of Science is the only database of citations and publications that covers all scientific domains internationally, while Scopus represents its good alternative since it is the largest database of citations and abstracts and conclude that the mentioned two databases cover the majority of current and relevant works and are therefore highly valued as they shape potential research fields. Moreover, the Croatian legislation recognises the works indexed in the two databases as the highest quality (Rulebook on the conditions for selection into scientific professions, NN 28/2017, document no. 652), another reason for choosing the two scientific bases just mentioned.

Bibliometric analysis of articles

Bibliometric analysis for "lifelong education" includes 272 publications from 1995 to 2022. The analysis is further enhanced by "Document type: Articles" and includes the following Web of Science categories: education, educational research, social sciences interdisciplinary, management, economics, business, and business finance.

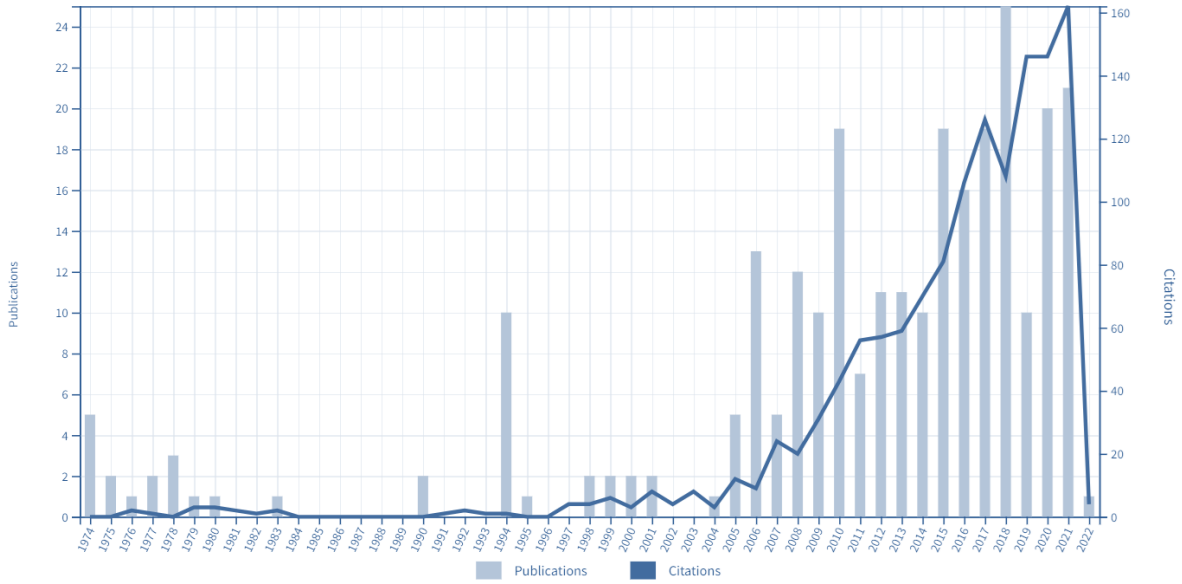
The total number of cited articles is 1,252. These citing articles cite one or more items in the citation report, while the total number of citing articles, but with removed articles that also appear in the citation report, is 1,228. The total number of citations of the analysed articles is 1,319, of which 1,289 are without self-citations, which makes the average per article 4.85. The average number of cited articles for all items in the result set. It is the sum of cited times divided by the number of results in the set. Furthermore, the h-index value is based on a list of publications arranged in descending order by the number of citations. An index of 19 means that there are 19 papers, each of which is cited at least 19 times.

Figure 1 visually shows the included publications and citations from 1974 to 2022. It can be noted that the topic of "lifelong education" was of most interest to researchers in 2018 and somewhat less so in 2010, 2015, 2017, 2020, and 2021. The topic's popularity growth is observed from 2005 to 2022, which means that additional growth can be expected in the next period. Recent research has examined and included various aspects of lifelong education, and raising the importance of the topic is aimed at generating and discovering new knowledge in the field of lifelong education through empirical methods (Lang, 2023).

The bibliometric analysis of the topic of lifelong education is grouped into the areas of educational research, interdisciplinary social sciences, management, economics, and others (Table 1). It can be noted that most of the research conducted in lifelong learning is focused on the field of Education, reaching a record number of 244 out of 272 or 89.71% of the included articles. Furthermore, Interdisciplinary Social Sciences comprise 12 out of 272 records or 4.41%, followed by a slightly smaller percentage of

3.31% or 9 records from the field of Management and 2.21% or 6 records from Economics. The rest of the 22 records included in the bibliometric analysis, or 8.09% belong to other fields.

Figure 1
Number of papers and citations in the Web of Science database



Source: Author's work, Web of Science (WoS) database; Retrieved 30th January, 2022

Table 1
The number of papers according to the field of research defined according to the Web of Science classification

Field	Record number	Structure in %
Education	244	89.71%
Interdisciplinary social sciences	12	4.41%
Management	9	3.31%
economy	6	2.21%
The rest	22	8.09%

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022

The bibliometric analysis was further extended to classify included articles by journals (Table 2). Most of the research, or 43 out of 272 records (15.81%) from the field of lifelong learning, were published in the Internet Journal of Lifelong Education, followed by 24 records, or 8.82%, in the International Review of Education, 6 records (2.21%) were published in the journal Educational Gerontology. Furthermore, the analysis shows that 5 articles, or 1.84%, were published in each of the journals: Adult Education Quarterly, European Journal for Research on the Education and Learning of Adults, Journal of Adult and Continuing Education, Education, and Science, Prospects, followed by 4 records each or 1.47% in the Asia Pacific Education Review and Science and Education Review.

Table 2
Structure of articles according to publication journals

Magazine	Record number	Structure in %
International Journal of Lifelong Education	43	15.81%
International Review of Education	24	8.82%
Educational Gerontology	6	2.21%
Adult Education Quarterly	5	1.84%
European Journal for Research on the Education and Learning of Adults	5	1.84%
Journal of Adult and Continuing Education	5	1.84%
Education and Science	5	1.84%
Prospects	5	1.84%
Asia Pacific Education Review	4	1.47%
Science and Education Review	4	1.47%
Czech Polish Historical and Pedagogical Journal	3	1.10%
E Mentor	3	1.10%
Education and Information Technologies	3	1.10%
Educational Philosophy and Theory	3	1.10%
Problems of Education in The 21st Century	3	1.10%
Studies in the Education of Adults Niace	3	1.10%
Turkish Online Journal of Distance Education	3	1.10%
British Journal of Educational Studies	2	0.74%
Comparative Education	2	0.74%
Croatian Journal of Education	2	0.74%
Didactica Slovenica Pedagogical Horizon	2	0.74%
Educar EM Magazine	2	0.74%
Economic Review	2	0.74%
Eurasia Journal of Mathematics Science and Technology Education	2	0.74%
Globalisation Societies and Education	2	0.74%

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022

Table 3 shows the publication of articles in open-access journals. Any article with a version available in the repository identified by Unpaywall is considered to belong to the green aspect. This process contains 18 or 17% green published articles, 5 or 2% green accepted, and 29 or 11% green submitted.

Table 3
The form of publication of articles according to open-access

Form of publication according to openness of access	Record number	Structure in %
All Open Access	69	25%
Gold	40	15%
Gold-Hybrid	3	1%
Free to Read	10	4%
Green Published	18	7%
Green Accepted	5	2%
Green Submitted	29	11%

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022

To determine the frequency of publication of articles in lifelong education by country, an additional analysis of the Web of Science database was carried out. The results are presented in Table 4. It can be noted that 10 or more articles were published in the USA, Canada, England, the People's Republic of China, Spain, Portugal, Russia, South

Korea, Australia and Brazil. Less than 10 articles were published in countries like Ukraine, Poland, Croatia, Greece, Turkey, Czech Republic, France, Slovakia, Slovenia, Chile, India, Italy, Japan, Malta and New Zealand.

Table 4
Representation of the country of origin of the authors of the articles

Countries/Regions	Record number	Structure in %
USA	25	9.2%
Canada	19	7.0%
England	19	7.0%
China	14	5.1%
Spain	14	5.1%
Portugal	13	4.8%
Russia	13	4.8%
South Korea	12	4.4%
Australia	11	4.0%
Brazil	10	3.7%
Ukraine	9	3.3%
Poland	8	2.9%
Croatia	7	2.6%
Greece	6	2.2%
Czech Republic	5	1.8%
France	5	1.8%
Slovakia	5	1.8%
Slovenia	5	1.8%
Chile	4	1.5%
India	4	1.5%
Italy	4	1.5%
Japan	4	1.5%
Malta	4	1.5%
New Zealand	4	1.5%

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022

To further expand the analysis, Table 5 presents the classification of the citation index of the included articles from the field of lifelong education. It can be noted that 176 out of 272 studies, or 64.71%, were published in journals included in the Emerging Sources Citation Index (ESCI), and the journals included in this index cover all disciplines and range from international and interdisciplinary publications to those that provide a deeper regional or specialised area coverage. The following 86 articles, or 31.62%, were published in journals with the Social Sciences Citation Index (SSCI) as a multidisciplinary index that indexes over 3000 social science journals - from 1985 to the present. Furthermore, 9 records, or 3.31%, were published in journals indexed in the Book Citation Index – Social Sciences & Humanities (BKCI-SSH), followed by 4 articles each or 1.47% contained in the Arts & Humanities Citation Index (A&HCI) and Science Citation Index Expanded (SCI-EXPANDED) and 1 research paper or 0.37% of the analysed records published in a journal with the Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH).

Table 5
Representation of the citation indexes in which the articles are indexed

Citation index	Record number	Structure in %
Emerging Sources Citation Index (ESCI)	176	64.71%
Social Sciences Citation Index (SSCI)	86	31.62%
Book Citation Index – Social Sciences & Humanities (BKCI-SSH)	9	3.31%
Arts & Humanities Citation Index (A&HCI)	4	1.47%
Science Citation Index Expanded (SCI-EXPANDED)	4	1.47%
Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH)	1	0.37%

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022

Identification of the most common research topics

To identify the most common research topics, in addition to the available tools offered by the scientific databases Web of Science and Scopus, the Wordstat tool was also used. For each 272 identified articles, the analysis used the following data: article title, abstract, and keywords.

Analysis of the frequency of occurrence of individual words

Word frequency analysis in publications has long been used to display the knowledge structure of research areas, which is considered a fundamental part of transferring knowledge concepts in bibliometric research and has been widely used to reveal the knowledge structure of study areas (Su & Lee, 2010). The use of frequent word analysis to derive new useful bibliometric indicators/approaches is essential for the continued growth of this subject area (Ding et al., 2001).

A comprehensive overview of common words used in the analysed articles from the field of lifelong education is presented in Table 6. The analysis includes frequency, percent frequency, number of cases, and percent of cases. For example, the word Education appears in 253 articles, in which it appears 1068 times. As shown in Table 6 and indicated by their frequency, Education, Learning, Lifelong, Development, Educational, Research, Study, Social, Adults, and Training are considered the most frequently used keywords in the analysed articles and are the most frequent words in the entire corpus of articles related to along with lifelong education.

Table 6
The most frequently represented keywords in the analysed articles

	Frequency	% total	No. of papers	% papers
Education	1068	2.20%	253	95.47%
Learning	615	1.27%	150	56.60%
Lifelong	568	1.17%	231	87.17%
Development	228	0.47%	99	37.36%
Educational	223	0.46%	107	40.38%
Research	166	0.34%	91	34.34%
Study	162	0.33%	89	33.58%
Social	152	0.31%	84	31.70%
Adult	146	0.30%	51	19.25%
Training	143	0.29%	67	25.28%
Students	136	0.28%	49	18.49%
Knowledge	123	0.25%	64	24.15%
Paper	122	0.25%	77	29.06%

Article	112	0.23%	83	31.32%
Based	112	0.23%	69	26.04%
Teachers	107	0.22%	41	15.47%
System	105	0.22%	55	20.75%
Professional	101	0.21%	33	12.45%
Analysis	96	0.20%	68	25.66%
Higher	95	0.20%	39	14.72%
Society	88	0.18%	62	23.40%
Life	87	0.18%	54	20.38%
Results	87	0.18%	62	23.40%
Work	83	0.17%	62	23.40%
University	75	0.15%	41	15.47%
School	74	0.15%	39	14.72%
Teaching	69	0.14%	28	10.57%
Concept	67	0.14%	38	14.34%
Formal	66	0.14%	31	11.70%
Process	64	0.13%	49	18.49%
Skills	63	0.13%	36	13.58%
Policy	62	0.13%	42	15.85%
Context	61	0.13%	44	16.60%
Economic	61	0.13%	35	13.21%
Quality	61	0.13%	33	12.45%
Model	57	0.12%	31	11.70%
Cultural	56	0.12%	31	11.70%
People	54	0.11%	39	14.72%
Methods	53	0.11%	34	12.83%
Practices	52	0.11%	39	14.72%
Role	52	0.11%	45	16.98%
World	52	0.11%	41	15.47%
Critical	51	0.10%	36	13.58%
Learners	51	0.10%	25	9.43%
Time	51	0.10%	29	10.94%
Approach	50	0.10%	34	12.83%
Policies	50	0.10%	28	10.57%
Humane	49	0.10%	31	11.70%
Age	48	0.10%	21	7.92%
Management	48	0.10%	20	7.55%
Days	47	0.10%	34	12.83%
National	47	0.10%	32	12.08%
Findings	46	0.09%	33	12.45%
Countries	45	0.09%	24	9.06%
Field	45	0.09%	31	11.70%
Part	45	0.09%	32	12.08%
European	44	0.09%	23	8.68%
Important	44	0.09%	37	13.96%
Adults	43	0.09%	27	10.19%
Children	43	0.09%	14	5.28%
Continuing	43	0.09%	25	9.43%
Experience	43	0.09%	24	9.06%
Informal	43	0.09%	22	8.30%
Main	43	0.09%	38	14.34%
Modern	43	0.09%	26	9.81%
Pedagogical	43	0.09%	22	8.30%
Current	42	0.09%	38	14.34%
Information	42	0.09%	32	12.08%

Practices	42	0.09%	29	10.94%
Competences	41	0.08%	14	5.28%
Courses	41	0.08%	22	8.30%
Institutions	41	0.08%	23	8.68%
Audience	41	0.08%	22	8.30%
Purpose	41	0.08%	35	13.21%
Future	40	0.08%	24	9.06%
Teacher	40	0.08%	19	7.17%
Focus	39	0.08%	31	11.70%
Importance	39	0.08%	30	11.32%
After	38	0.08%	30	11.32%
Basic	38	0.08%	27	10.19%
Participation	37	0.08%	28	10.57%
Framework	36	0.07%	31	11.70%
Level	36	0.07%	25	9.43%
Literature	36	0.07%	18	6.79%
State	36	0.07%	29	10.94%
Activities	35	0.07%	25	9.43%
Individual	35	0.07%	32	12.08%
Personnel	35	0.07%	28	10.57%
Problems	35	0.07%	23	8.68%
Active	34	0.07%	19	7.17%
Present	34	0.07%	29	10.94%
Vocational	34	0.07%	15	5.66%
Academic	33	0.07%	26	9.81%
Challenges	33	0.07%	27	10.19%
Programmes	33	0.07%	22	8.30%
Programs	33	0.07%	24	9.06%
Related	33	0.07%	30	11.32%
Author	32	0.07%	20	7.55%
Economy	32	0.07%	21	7.92%
Educators	32	0.07%	24	9.06%
Methodology	32	0.07%	28	10.57%
Order	32	0.07%	30	11.32%
Strategies	32	0.07%	27	10.19%
Aim	31	0.06%	29	10.94%
Assessment	31	0.06%	11	4.15%
Formation	31	0.06%	17	6.42%
Language	31	0.06%	12	4.53%
Processes	31	0.06%	24	9.06%
Technology	31	0.06%	20	7.55%
Case	30	0.06%	24	9.06%
Innovative	30	0.06%	17	6.42%
Opportunities	30	0.06%	28	10.57%
Political	30	0.06%	26	9.81%

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022; analysed using Wordstat Provalis

A word cloud (Heimerl et al., 2014) was generated and shown in Figure 2 to demonstrate the use of the most frequent keywords in the analysed articles on lifelong education.

Figure 2
Word-cloud graph of the most frequently used words in scientific articles on lifelong learning

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022; analysed using Wordstat Provalis

Analysis of the frequency of occurrence of certain phrases

To determine the most frequently used phrases with the frequency of appearance in more than 5 scientific articles in the field of lifelong education, an analysis was carried out in the Wordstat Provalis software (Table 7).

The phrase importance metric values are in the TF*IDF column (Kim et al., 2019), which can be used to estimate the importance of a phrase in a large number of documents (for example, abstracts of all studied patents in a certain field), rather than just one document (for example, an abstract of only one article). As a result, TF-IDF is a measure that allows authors to estimate the importance of a phrase in many studied articles.

Table 7
The most frequent phrases in the analysed articles (5+ articles)

	No. of occurrences	No. of papers	% papers	TF • IDF
European Union	16	9	3.31%	23.7
Older Adults	16	8	2.94%	24.5
Critical Thinking	15	6	2.21%	24.8
Quality of Life	14	8	2.94%	21.4
Poverty Reduction	13	3	1.10%	25.4
Professional Training	12	8	2.94%	18.4
Socio Economic	12	10	3.68%	17.2
Linguistic Personality	11	1	0.37%	26.8
Adult Educators	10	6	2.21%	16.6
Formal and Informal	10	10	3.68%	14.3
Human Capital	10	5	1.84%	17.4
Active Citizenship	9	4	1.47%	16.5
Formal Adult	9	3	1.10%	17.6
Knowledge and Skills	9	7	2.57%	14.3
Labour Market	9	5	1.84%	15.6

Life Long	9	6	2.21%	14.9
South Korea	9	4	1.47%	16.5
Eastern Africa	8	1	0.37%	19.5
United Nations	8	6	2.21%	13.3
United States	8	5	1.84%	13.9
Entrepreneurial Competences	7	1	0.37%	17.0
Future Teachers	7	3	1.10%	13.7
Information and Communication	7	6	2.21%	11.6
Labour Market	7	6	2.21%	11.6
Nonformal and Informal	7	1	0.37%	17.0
Public Education Centres	7	1	0.37%	17.0
Senior Citizens	7	2	0.74%	14.9
Teacher Training	7	4	1.47%	12.8
University Students	7	3	1.10%	13.7
Concept of Higher	6	1	0.37%	14.6
Continuous Training	6	5	1.84%	10.4
Digital Inclusion	6	2	0.74%	12.8
Elderly Learners	6	2	0.74%	12.8
Formative Assessment	6	2	0.74%	12.8
Higher Technical Educational Institutions	6	1	0.37%	14.6
Hong Kong	6	2	0.74%	12.8
Knowledge-Economy	6	2	0.74%	12.8
Lean Production	6	1	0.37%	14.6
Older Women	6	1	0.37%	14.6
Professional Activity	6	4	1.47%	11.0
Professional Concept	6	1	0.37%	14.6
Professional Preparation	6	3	1.10%	11.7
Social Networks	6	3	1.10%	11.7
Ukrainian Language	6	1	0.37%	14.6
Vocational Training	6	3	1.10%	11.7
Young People	6	5	1.84%	10.4
Adult Continuing	5	2	0.74%	10.7
Adult Education Policies	5	2	0.74%	10.7
Adult Learners	5	5	1.84%	8.7
Beginning of Old Age	5	1	0.37%	12.2
Competence Context Model	5	2	0.74%	10.7
Decision Making	5	4	1.47%	9.2
Design Methodology Approach	5	5	1.84%	8.7
Digital Divide	5	4	1.47%	9.2
Economic Competence	5	1	0.37%	12.2
Electronic Portfolio	5	1	0.37%	12.2
Free Time	5	2	0.74%	10.7
Guidelines for Lifelong Education Management	5	1	0.37%	12.2
Human Beings	5	2	0.74%	10.7
Human Rights	5	2	0.74%	10.7
Impaired Learners	5	1	0.37%	12.2
Individual and Collective	5	4	1.47%	9.2
Innovative Business Structures	5	1	0.37%	12.2

Late Life	5	2	0.74%	10.7
Management to Mobilize	5	1	0.37%	12.2
Online Courses	5	4	1.47%	9.2
Professionalism and Professional	5	1	0.37%	12.2
Public Policies	5	5	1.84%	8.7
Questionnaire Survey	5	5	1.84%	8.7
Recent Years	5	5	1.84%	8.7
Scientific Novelty	5	5	1.84%	8.7
Semi-Structured	5	5	1.84%	8.7
Social Cultural Context	5	1	0.37%	12.2
Social Purpose	5	2	0.74%	10.7
Transversal Competences	5	1	0.37%	12.2
University Professors	5	2	0.74%	10.7
Women of Color	5	1	0.37%	12.2
Year College Students	5	1	0.37%	12.2
Youth Work	5	1	0.37%	12.2

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022; analysed using Wordstat Provalis

The ability to compare the frequency of phrases or groups of content in different sources (e.g., journals, countries) or to look for variations over time could be used to track the development of a scientific discipline, the rise and fall of specific ideas or concepts, the process of differentiation of scientific publications, or the geospatial distribution of scientific activities (Provalis, 2022). A schematic diagram was created, shown in Figure 3. to highlight the use of the most popular phrases in the researched lifelong learning publications.

Figure 3
Word-cloud graph of the most frequently used words in scientific articles on lifelong learning

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022; analysed using Wordstat Provalis

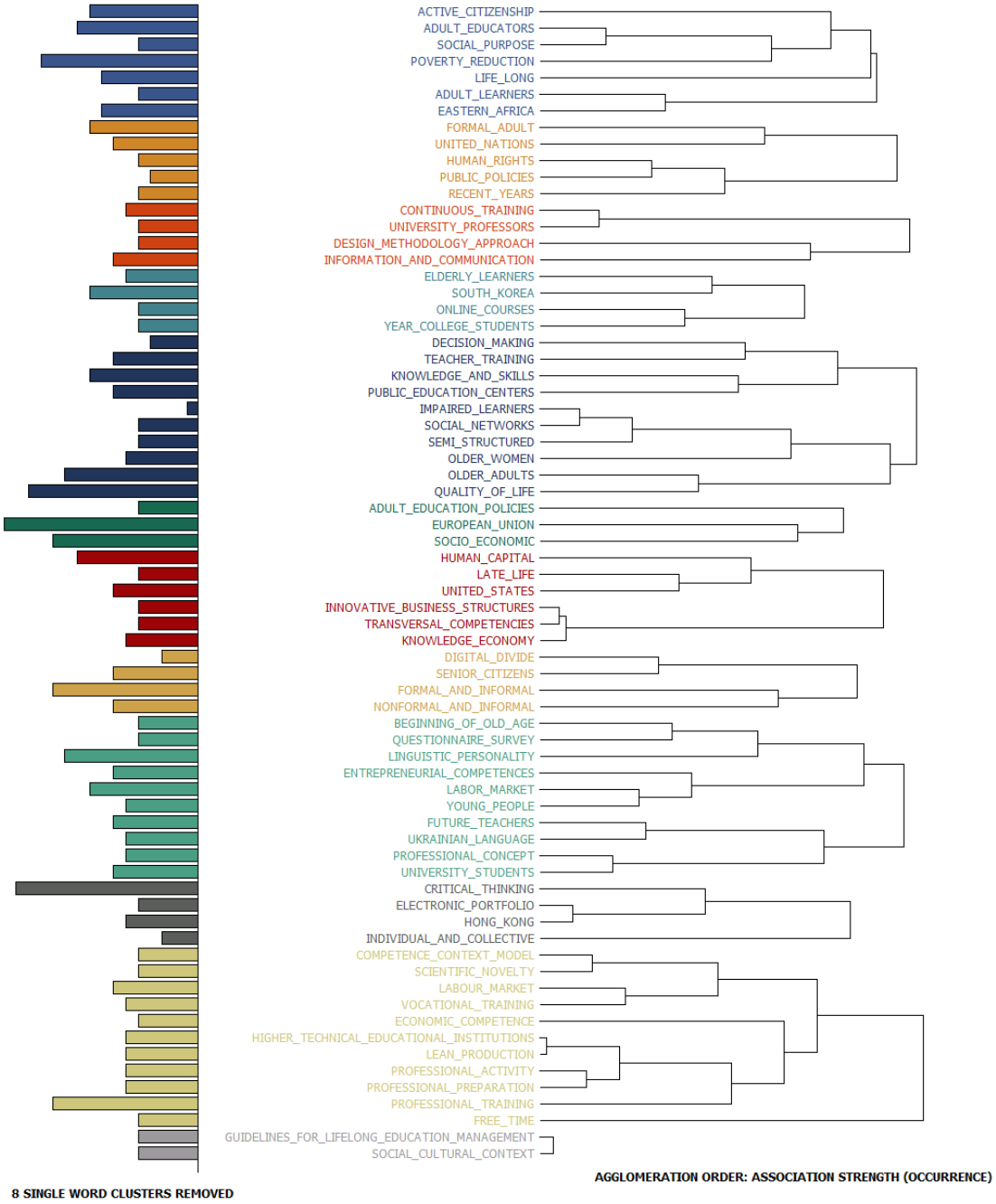
Cluster analysis of selected phrases

Cluster analysis of isolated phrases can be used to identify themes that appear in research on lifelong learning (Chang et al., 2021). Phrases that usually occur together are joined in the first step in the agglomeration process. In contrast, those that are independent of each other or do not appear together are joined later (Provalis, 2022). A cluster analysis was carried out to identify topics related to lifelong education, which identified 12 topics (Figure 4).

Based on the extracted phrases, clusters were generated. The result is displayed as a dendrogram (Eryilmaz et al., 2022). Items are represented on the vertical axis, while clusters created at each stage of the clustering operation are represented on the horizontal axis.

- Cluster 1 includes abstracts of 7 groups of scholarly articles, with the phrases appearing: poverty reduction and active citizenship in East Africa for social purposes; lifelong, adult learners and adult teachers in East Africa.
- Cluster 2 includes abstracts of 5 groups of scholarly articles with co-occurring phrases: public policies and human rights of formal adults in the United Nations in recent years.
- Cluster 3 includes summaries of 4 groups of scientific articles with co-occurring phrases: an approach to design methodology for information and communication and continuous professional development of university professors.
- Cluster 4 includes 4 groups of scholarly articles with co-occurring phrases: online courses for college-aged and senior students in South Korea.
- Cluster 5 includes abstracts of 10 groups of research articles with co-occurring phrases: quality of life and social networking of older adults, older women, and students with learning disabilities using a semi-structured approach; decision-making and teacher training in public education centres using a semi-structured approach.
- Cluster 6 includes summaries of 3 groups of scientific articles with co-occurring phrases: socioeconomic and adult education policies in the European Union.
- Cluster 7 includes abstracts of 6 groups of scientific articles with co-occurring phrases: transversal human capital competencies in late life, innovative business structures, and the knowledge economy in the United States.
- Cluster 8 includes 4 scientific articles with co-occurring phrases: formal and informal, informal and informal, digital divide, and senior citizens.
- Cluster 9 includes 10 groups of scientific articles with associated phrases: determination of language personality of prospective teachers of the Ukrainian language using a questionnaire; research of entrepreneurial competencies and professional concepts of students and young people on the labour market using questionnaires.
- Cluster 10 includes abstracts of 4 groups of scholarly articles with co-occurring phrases: critical thinking and individual and collective electronic portfolio in Hong Kong.
- Cluster 11 includes 11 groups of scientific articles with phrases that appear together: vocational training, vocational training, vocational training in higher technical educational institutions; professional activity and lean production in the labour market; development of competence models and determination of economic competence.
- Cluster 12 includes abstracts of 2 groups of co-occurring scientific articles: guiding lifelong learning management in a socio-cultural context.

Figure 4
Cluster analysis of the most frequent phrases in the analysed articles (5+ articles)

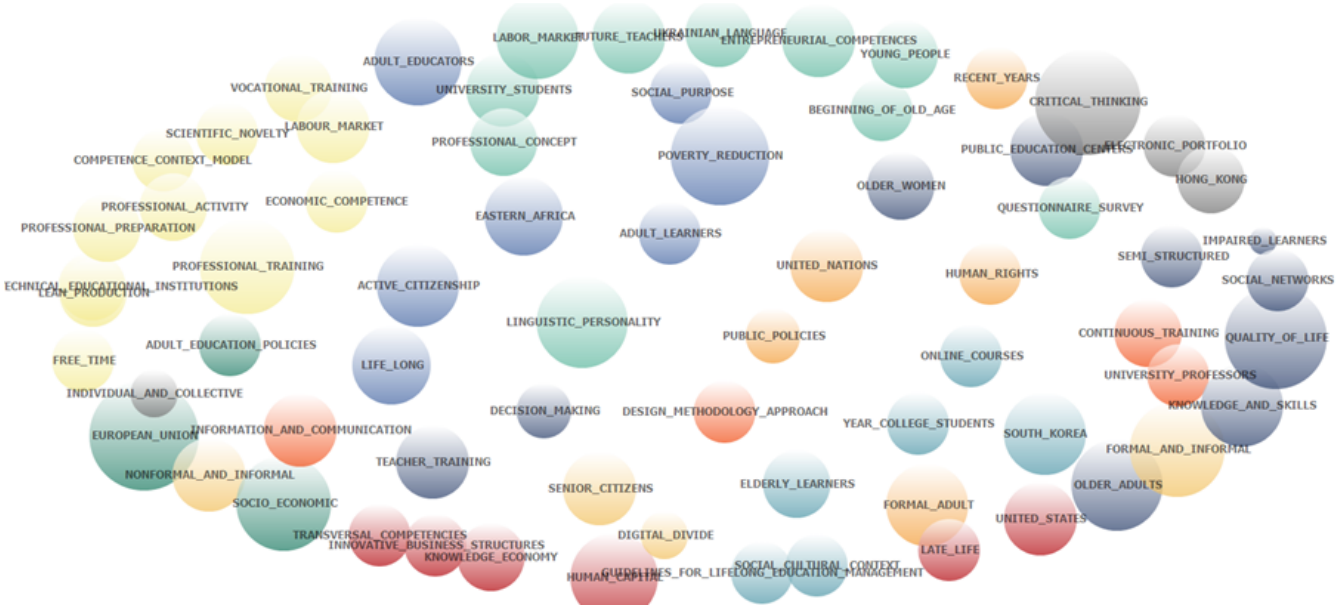


Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022; analysed using Wordstat Provalis

Concept maps can represent proximity values calculated for all included keywords using multidimensional scaling (Taricani & Clariana, 2006). A point represents an item (keyword or content category) on the concept maps, and the distances between pairs of items reflect the probability that these items appear together. In other words, things that appear close to each other on the graph are more likely to appear together, while terms or categories that are unrelated or do not appear together are

spread throughout the graph. Colours indicate the belonging of certain items in different hierarchical groups. In this connection, Figure 5 represents 12 previously identified and analysed clusters.

Figure 5
Conceptual map of clusters of the most frequently represented phrases in the analysed articles (5+ articles)



Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022; analysed using Wordstat Provalis

Analysis of topics in articles whose subject is a lifelong education

Topic extraction is a key step in bibliometric data analysis, text mining, and knowledge discovery, as it identifies important topics from large groups of scholarly articles (Pejić Bach et al., 2019). Traditional topic extraction systems need human interaction and involve extensive data preparation to represent text collections properly. For this purpose and with a focus on lifelong education, the most common topics were singled out, along with their coherence indicator (Normalized Point Mutual Information - NPMI) and the number or percentage of cases in which they appear (Bouma, 2009).

The results of the analysis are presented in Table 8. Most of the topics are related to the various aspects of learning, such as professional training, technology and time, and higher institutions. Several topics stress various aspects of the subject of lifelong learning, such as sustainability, entrepreneurship, and their balance (Pejić Bach et al., 2023).

Table 8
Topics extracted with Wordstat software

NO	Topic	Keywords	Coherence (NPMI)	Freq.	Cases	% Cases
1	Professional Training	Professional; Teachers; Methodology; Aim; Data; Personal; Pedagogical; Training; Quality; Work; Teacher; School; Practice; Level; Professional Training;	0,306	267	99	37,36%
2	Technology Time	Technology; Time; Main; Assessment; Basic; Information; Innovative; Modern; Economy; Knowledge; Skills; Professional; After; System; Vocational; Information and Communication;	0,165	265	102	38,49%
3	Field Policies	Field; Policies; Strategies; Importance; Practices; Aim; Political; Educators; Economic; Focus; Policy; Adult; Social; Critical; International Journal; Important Role;	0,163	248	108	40,75%
4	Higher Institutions	Higher; Institutions; University; Courses; Innovative; Students; Academic; Future; Present; Knowledge;	0,230	200	75	28,30%
5	Cultural Approach	Cultural; Approach; Personal; Concept; Part; Aim; Methodology; Order; Social; Language;	0,233	136	80	30,19%
6	Pedagogical Framework	Pedagogical; Framework; Context; Author; Part; European; Teaching; Practice; Basic; Challenges; World;	0,232	115	62	23,40%
7	Adults Academic	Adults; Academic; Adult; Teaching; Continuing; Public; Language;	0,126	109	64	24,15%

Table 8 (continued)
Topics extracted with Wordstat software

NO	Topic	Keywords	Coherence (NPMI)	Freq.	Cases	% Cases
8	Quality Of Life Programs	Programs; Age; Life; Activities; Participation; Social; Quality of Life; Older Adults; Young People;	0,195	98	54	20,38%
9	National Countries	National; Countries; Public; Formation; Economy; State; Policies; Main; Level;	0,235	89	51	19,25%
10	Formal And Informal	Formal; Informal; Experience; Adults; Formal and Informal;	0,179	84	38	14,34%
11	European	European; Programmes; Countries; Current; Policy; Strategies; System; Labour Market; Human Capital;	0,161	71	51	19,25%
12	Opportunities Participation	Opportunities; Participation; Learners; Society; Critical;	0,190	60	40	15,09%
13	Competence Model	Competence; Model; Formation; Individual; Approach;	0,202	60	27	10,19%
14	Human Processes	Human; Processes; Management; Current; Order; Related;	0,180	54	32	12,08%
15	Challenges Important	Challenges; Important; Vocational; Assessment; Active; Courses;	0,146	47	33	12,45%

Source: Author's work, Web of Science (WoS) database; Retrieved 30th January 2022; analysed using Wordstat Provalis

Conclusion

Lifelong education is traditionally a research topic investigated within psychology and education. However, lifelong education is important in economics, business, and management.

The Web of Knowledge has been researched with the keywords "lifelong education" narrowed to the papers published in scientific journals in Business, Management, and Economics, resulting in 272 papers. The collected papers have been examined using bibliometric analysis, including analysing the most frequent journals, authors, countries, and funding institutions. The most cited papers have been analysed. The research topics have been investigated using text mining, which revealed the most frequent keywords, phrases, and topics. Provalis Wordstat has been used for content analysis, resulting in clusters of the phrases that occur the most often in the paper titles, abstracts, and keywords.

The most important results are as follows. Most research in lifelong education was published in the International Journal of Lifelong Education, followed by the International Review of Education and Educational Gerontology. A comprehensive overview of common words used in the analysed articles in lifelong education. The analysis includes frequency, percentage of frequency, number of cases, and percentage of cases. The most frequent words occurring in the titles and abstracts of the examined papers are education, learning, lifelong education, development, educational, research, study, social, adult, and training. The most frequent phrases identified are as follows: European Union, older adults, critical thinking, quality of life, poverty reduction, professional training, socioeconomic, adult educators, formal and informal, and human capital.

Cluster analysis of isolated phrases can identify topics that appear in research on lifelong education. Phrases that usually appear together merge in the first step in the agglomeration process, while those that are independent or do not appear together merge later. To identify topics related to the topic of lifelong education, a cluster analysis was conducted, which identified 12 groups of topics. The topics including the largest number of scientific articles are as following: (i) Cluster 1 includes summaries of 7 groups of scientific articles with phrases that appear: poverty reduction and active citizenship in East Africa for social purposes; lifelong, adult learners and adult teachers in East Africa; (ii) Cluster 2 includes summaries of 5 groups of scientific articles with phrases that appear together: public policies and human rights of formal adults at the United Nations; (iii) Cluster 3 includes summaries of 4 groups of scientific articles with phrases that appear together: design methodology, information and communication technologies, continuous improvement, and university professors, and (iv) Cluster 4 includes summaries of 10 groups of scientific articles with phrases that appear together: quality of life and social networking of older adults, older women and students with disabilities using a semi-structured approach; decision-making and in-service teacher training in public education centres using a semi-structured approach.

Bibliometric analysis and topic mining of the articles investigating the topic of lifelong education indicate that the number of papers in this area is increasing, with most papers published in educational journals. The most frequent keywords and phrases indicate that lifelong education is mostly related to the human capital translated into the benefits relevant for adult learners, thus supporting nations' economic and social development.

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