Universal Research Trends of Rubric: An Assessment Tool

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Abstract: The present study aims to provide a comprehensive bibliometric analysis of rubric research. The bibliometric method was employed to evaluate research output in the field. The study evaluated 13,651 Scopus publications from 1850 to 2023using Vosviewer, Biblishiny, and MS-Excel using bibliometric software. Notable findings include an 80% increase in scientific contributions over the previous two decades, with 2023 having the highest publication count at 1172. The study analyzes years, top-cited papers, sources, prolific authors, and leading organizations and countries in rubrics research. Clusters of co-occurring author keywords suggest common topics, including Education and learning methods (Cluster # 1), Professional development and skills (Cluster # 2), Learning and education research (Cluster # 3), Assessment and evaluation in nursing education (Cluster # 4), Assessment and accreditation in education (Cluster # 5), Assessment and scoring in writing education (Cluster # 6), and Pedagogy and innovation in education (Cluster # 7).This bibliometric study provides valuable insights for educators and researchers, guiding future research and enhancing global understanding of rubrics in educational contexts.

Keywords: Rubric, Educational assessment tool, Bibliometric, Research productivity, Research evaluation.

1. Introduction

Rubrics are indispensable tools in educational assessment, as they provide a structured framework for evaluating students' work across various academic tasks such as written assignments, oral presentations, and teamwork (Jonsson 2014). The ability of rubrics to serve both formative and summative purposes highlights their importance in grading procedures and their role in facilitating

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peer review, achieved through the establishment of standardized evaluation criteria (Wolf and Stevens 2007). The extensive use of rubrics in higher education effectively enhances student performance and promotes the cultivation of self-regulated learning processes (Wolf and Stevens 2007).

Rubrics, consisting of categories, defined evaluation criteria, and graded descriptions delineating different levels of quality in student performance, provide crucial information for educators (Myskow, Takada, and Aida 2020). The methodology utilized in assessment based on rubrics entails a comprehensive evaluation of various aspects, such as the quality of the essay, organization, utilization of examples, structure of paragraphs, and grammatical accuracy (Reddy and Andrade 2010). Incorporating detailed descriptors for performance levels enhances the evaluation process, resulting in a more sophisticated and objective approach.

Rubrics assist educators in evaluating student performance and offer students clear instructions for comprehending their goals. The explicitness of the evaluation criteria empowers students to comprehend, scrutinize, and assess their own work as well as that of their peers, which in turn promotes the cultivation of self-assessment skills and a more profound comprehension of academic benchmarks (Sudakova et al. 2022). The provision of rubrics to students augments academic accomplishment and self-assurance, particularly within higher education environments.

Numerous investigations highlight the significant influence of rubrics on motivating aspects, such as students' scholastic accomplishments and belief in their capabilities (Farid 2014). By their systematic organization, rubrics mitigate cognitive load and give students a distinct trajectory toward academic eminence. By providing unambiguous criteria for success, rubrics allow students to assume accountability for their learning and effectively manage their endeavors (Jönsson 2022). Furthermore, rubrics find practicality in technical vocations within conventional educational settings, evaluating expertise and enhancing the quality of projects.

Despite the acknowledged advantages of rubrics, it is essential to conduct further research to gain a deep understanding of how assessors employ rubrics and interpret the results. By investigating the impact of rubrics on student learning and motivation, it becomes possible to refine their utilization in educational contexts. The ongoing pursuit of research is of utmost importance as it informs and enhances the effectiveness of assessment tools such as rubrics, particularly in light of the ever-evolving nature of educational activities. Rubrics

are crucial assessment tools in today's scenario by providing a systematic and standardized approach to evaluation, thereby significantly enhancing motivation and performance. The present study aims to comprehensively analyze the research output on rubrics, revealing a notable gap in the lack of extensive bibliometric research utilizing the Scopus database.

2. Comprehensive Overview Existing Literature on Rubric

Knight, (2006) assessed the attainment of information literacy learning outcomes in research and writing courses among undergraduate students, with a particular focus on academic performance as a key indication of these results.

Arora *et al.*, (2013) employed Natural Language Processing (NLP) methodology and text chunking to analyze NL requirement statements and identify problematic syntactic elements. The rubric tool produces precise outcomes, even during the first phases of requirements drafting. Moreover, it is capable of being used again for extensive collections of needs as they progress, demonstrating its scalability.

Cazorla *et al.*, (2018) examined the cooperative endeavor of creating rubrics for a three-year Workshop Project in Industrial Design Engineering and Product Development. The rubrics aim to enhance students' achievements and proficiency, enabling the comparison of course outcomes and advancement. The rubrics will be available online, specifically on evaluating outcomes and skills, potentially enhancing academic achievement and project excellence.

Krebs, Rothstein and Roelle, (2022) conducted a study involving 93 high school students revealed that the provision of rubrics for self-assessment of self-written scientific abstracts resulted in improved accuracy of judgment, less bias, and lower cognitive load. This implies that the effectiveness of rubrics is attributed to improving the accuracy of judgment.

Thị Huyền, Hoan and Thuy (2023) evaluated the effectiveness of rubrics as a useful tool for students to judge their work, utilizing data from 69 databases covering the period from 2006 to 2021. It highlights the efficacy of rubrics in helping the process of learning.

3. Research objectives

- To identify the annual growth of publications and Citation trends in rubric research
- To examine the most productive authors, organizations, and countries in the rubric
- To know the most cited papers in the rubrics research
- To examine leading collaborative countries in the field
- To analyze the author keywords in rubric research.

4. Research methodology

The methodology portion of this bibliometric research describes the systematic strategy used to gather, analyze, and evaluate data concerning rubrics. Using the Scopus database, our objective was to offer a thorough analysis of the academic field, highlighting important patterns of notable authors and developing issues within the realm of rubrics study.

4.1. Database Selection

The Scopus database was selected because it covers scientific literature, encompassing academic journals, conference proceedings, and other respected publications. This compilation guarantees a strong and all-encompassing portrayal of research on rubrics.

4.2. Search Strategy

An intricately designed search technique was devised to obtain pertinent content. The search was conducted using TITLE-ABS-KEY (“rubric*”). The search was limited to publications published till the current date (1850-2023).

4.3. Criteria for Inclusion and Exclusion

In order to ensure the continued relevance and high quality of the dataset, specific criteria for inclusion were created. The articles needed to undergo peer review, be published in English, and be specifically relevant to using, creating, or evaluating rubrics. Excluded from consideration were non-peer-reviewed

literature, duplicate records, and papers that did not match the inclusion requirements.

4.4. Data Analysis

A total of 13651 publications were selected for final analysis. Data analysis was conducted using bibliometric software tools like VOSviewer and Biblioshiny. These technologies enabled the retrieval of bibliographic data, co-author relationships, citation trends, and matrices showing the presence of keywords together. The visualization outputs provide a vivid depiction of the study terrain.

5. Analysis of the results

Table (1) presents the main data on rubrics research that involves the analysis of 12122 documents from 5800 sources over a 172-year timespan from 1850 to 2022. The collection shows an average annual growth rate of 3.62%, an average document age of 9.34 years, and an average of 14.94 citations per document. The researchers identified 456105 references, 23315 Keywords Plus (ID), and 21108 Author's Keywords (DE) within the documents, suggesting a thorough approach to analysis. Additionally, the collection shows 28430 authors, 3692 single-authored documents, an average of 2.85 co-authors per document, and 10.42% international co-authorships.

Table (1): Main Information about the rubrics research publications

Description	Results
Timespan	1850:2023
Sources (Journals, Books, etc)	5800
Documents	13651
Annual Growth Rate %	3.62
Document Average Age	9.34
Average citations per doc	14.94
References	456105
DOCUMENT CONTENTS	
Keywords Plus (ID)	23315

Author's Keywords (DE)	21108
AUTHORS	
Authors	28430
Authors of single-authored docs	3692
AUTHORS COLLABORATION	
Single-authored docs	4043
Co-Authors per Doc	2.85
International co-authorships %	10.42

5.1. Yearly growth and citation trends in rubrics research between 1850 and 2022

Figure (1) shows the yearly growth and citation trends in rubrics research publications between 1850 and 2022. The first research published in the field of rubrics was published in 1850 (TP=2), and the maximum research contributed in 2023 with 1172 publications, followed by 2021 with 1096 publications, 2020 with 1037 publications, 2019 with 1015 publications, and 2018 with 892 publications. There is no publications in 1851, 1855, 1858, 1859, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1875, 1876, 1877, 1879, 1880, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1898, 1900, 1901, 1902, 1903, 1904, 1905, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1916, 1917, 1919, 1920, 1922, 1923, 1924, 1925, 1926, 1930, 1933, 1935, 1936, 1937, 1938, 1939, 1941, 1943, 1944, 1945, 1946, 1947, 1949, 1950, 1951, 1953, 1956, 1957 and 1960. In contrast, years with single publications are 1852, 1856, 1860, 1862, 1878, 1881, 1899, 1906, 1918, 1931, 1932, 1934, 1940, 1942, 1954, 1958, 1959, 1961, and 1966.

The analysis shows that 2011 was the most cited year, with 12740 citations, followed by 2007, with 12062 citations, 2014 with 8663 citations, 2008 with 8382 citations, and 2017 with 8179 citations.The highest mean total citation per article (TC/TP) was recorded in 1961, with 95, followed by 1990 with 78.38 TC/TP, 1955 with 76.50 TC/TP, and 2000 with 70.24 TC/TP.The figure (1) shows that there was very little published research until the late 1800s and that the number of publications and citations grew rapidly in the 1900s.

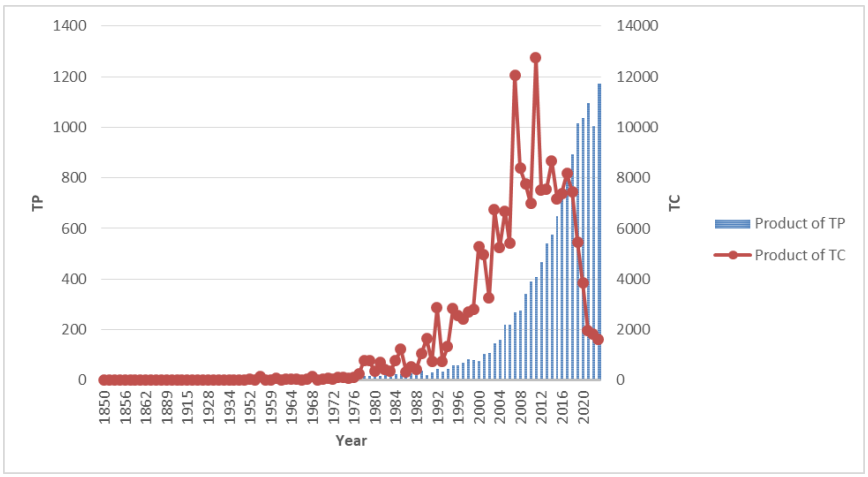

Figure (1): Yearly growth and citation trends in rubrics research between 1850 and 2023

5.2. Most relevant sources in rubrics research

Table (2) evaluated the top 25 most relevant sources in rubrics research between 1850 and 2022. The analysis shows that ASEE Annual Conference and Exposition, Conference Proceedings was the productive source in rubrics research during the study period, with 373 publications, followed by the American Journal of Pharmaceutical Education, with 82 publications; Journal of Physics: Conference Series with 81 publications, Proceedings - Frontiers in Education Conference with 77 publications, and Assessing Writing with 64 publication. Nursing Education Perspectives was the least productive source among the top 25, with 21 publications.

Regarding citation trends, Assessment and Evaluation in Higher Education was the most cited source with 1764 citations, followed by ASEE Annual Conference and Exposition, Conference Proceedings with 1365 citations, and Assessing Writing with 1320 citations.Journal of Engineering Education Transformations was the least cited source among the top 25 sources, with 44 citations.

The h-index measures the number of publications and their impact and is calculated based on the number of publications and citations. The source with

the highest h-index is Assessing Writing, with 21, followed by Assessment and Evaluation in Higher Education, with a score of 19, and the American Journal of Pharmaceutical Education, with 19, respectively.

The g-index is a similar measure that considers the number of highly cited publications and the total number of citations. The source with the highest g-index is Assessment and Evaluation in Higher Education, with a score of 41, followed by Assessing Writing, with 33.

Finally, the table also shows each source's year of the first publication (PY_start). The oldest source in the list is Lecture Notes in Computer Science, published in 1992, while the most recent source is the Journal of Engineering Education Transformations, which started publishing in 2018.

Table (2): Top 25 most relevant sources in rubrics research between 1850 and 2022

Rank	Sources	TP	TC	h_index	g_index	PY_start
1	ASEE Annual Conference and Exposition, Conference Proceedings	373	1365	12	15	2005
2	American Journal of Pharmaceutical Education	82	1001	19	25	2001
3	Journal of Physics: Conference Series	81	207	7	8	2017
4	Proceedings - Frontiers in Education Conference, Fie	77	333	9	12	2003
5	Assessing Writing	64	1320	21	33	1995
6	International Journal of Engineering Education	58	496	11	18	2002
7	Currents In Pharmacy Teaching And Learning	56	545	8	21	2012
8	Assessment and Evaluation in Higher Education	54	1764	19	41	2005
9	ACM International Conference Proceeding Series	41	306	10	15	2006
10	Academic Medicine	34	870	16	29	1997
11	BMC Medical Education	34	568	12	23	2008
12	Journal of Chemical	34	487	12	21	2010

	Education					
13	Journal of Dental Education	32	262	9	14	2003
14	Nurse Education Today	30	420	12	19	2009
15	International Journal of Instruction	30	287	10	15	2015
16	AEEE Annual Conference Proceedings	30	261	9	15	1998
17	Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes In Bioinformatics)	30	139	6	9	1992
18	Journal of Nursing Education	29	796	12	28	2004
19	AIP Conference Proceedings	28	179	8	12	2005
20	Sustainability (Switzerland)	24	317	9	17	2016
21	Zootaxa	24	179	7	12	2007
22	Clinical Simulation in Nursing	23	304	10	17	2013
23	IEEE Global Engineering Education Conference, Educon	23	114	6	9	2012
24	Journal of Engineering Education Transformations	22	44	3	4	2018
25	Nursing Education Perspectives	21	368	10	19	2007

5.3. Prolific authors in rubrics research

Table (3) represents the top 25 most productive authors in rubrics research between 1850 and 2022. Kranov AA has the highest total publications (TP), with 19. An h-index of 7, indicating that 7 of his publications have at least seven citations each, followed by Weston MA is ranked second with 17 publications and has an h-index of 11, Panadero E with 15 publication and has an h-index of 12, which is the highest among top 25 listed authors. Park S, Maguire GS, Li J, Tractenberg RE, Company P, Contero M, Davis D, Rusman E, Bielefeldt AR, and ESTELL JK were the least cited in the table with nine publications each.

Panadero E has the highest total citations (TC) with 1293, which indicates that her research papers have been highly influential in the field of rubrics research,

followed by Lasater K with 781 citations and Weston MA with 458 citations.Rusman E was the least cited in the list, with 37 citations. Overall, this table provides valuable information about the most prolific authors in rubrics research and can help researchers identify key contributors to the field.

Table (3): Top 25 most prolific authors in rubrics research between 1850 and 2022

Rank	Element	TP	TC	h_index	g_index	PY_start
1	Kranov AA	19	139	7	11	2008
2	Weston MA	17	458	11	17	1999
3	Panadero E	15	1293	12	15	2012
4	Golnik KC	14	216	8	14	2005
5	Lasater K	13	781	10	13	2007
6	Wang X	13	338	8	13	2008
7	Chen W	12	187	8	12	2000
8	Linn MC	12	303	7	12	2008
9	Wang J	11	169	7	11	2012
10	Beyerlein S	11	89	5	9	2003
11	Danaher M	11	84	5	8	2014
12	Robertson LN	11	66	5	7	1981
13	Liu Y	10	239	6	10	2014
14	Schoepp K	10	80	5	8	2014
15	Samson PR	10	40	4	5	1991
16	Park S	9	376	8	9	2010
17	Maguire GS	9	166	7	9	2009
18	Li J	9	95	6	9	2005
19	Tractenberg RE	9	94	6	9	2010
20	Company P	9	92	5	9	2013
21	Contero M	9	92	5	9	2013
22	Davis D	9	86	5	9	2003
23	Rusman E	9	37	5	5	2016
24	Bielefeldt AR	9	39	4	6	2011

25	ESTELL JK	9	59	4	7	2000

5.4. Most productive affiliations in rubrics research between 1850 and 2022

Figure (2) shows the top 25 most productive affiliations engaged in rubrics research between 1850 and 2022. The University of California, the USA leading productive country in the field of rubrics research with 321 publications, followed by Purdue University with 151 publications; the University of Pittsburgh with 134 publications; the University of Pendidikan, Indonesia, with 107 publications; and the University of Michigan with 95 publications. The University of North Carolina, the USA, was the least productive affiliation among the top 25 affiliations, with 53 publications.

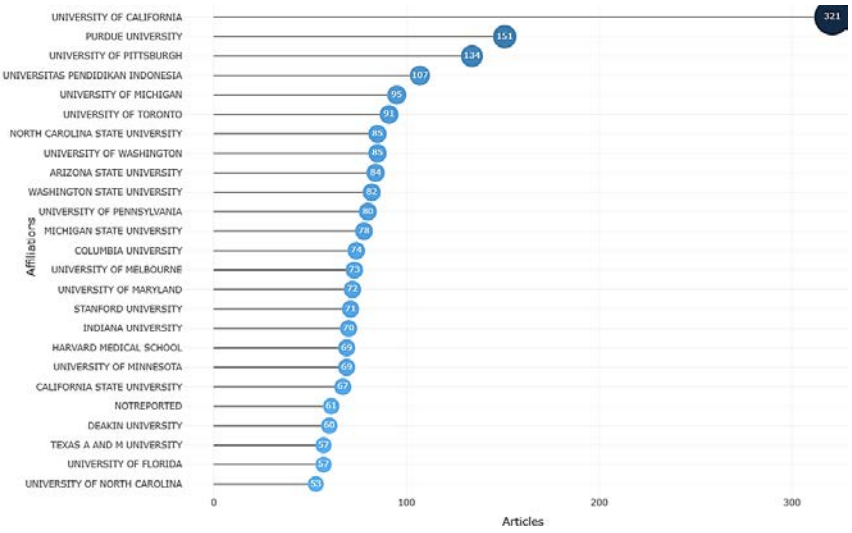

Figure (2): Productive affiliations in rubrics research

5.5. Productive countries in rubrics research between 1850 and 2022.

Table (4) presents the top 25 most productive countries in rubrics research from 1850 to 2022. The United States tops the list with 6,316 publications and 118,269 citations. The United Kingdom is ranked second with 732 publications and 18,668 citations, Australia with 650 publications and 16,458 citations, Canada with 591 publications and 16,968 citations, and Spain with 385 and 4672 citations. Austria was the least productive country, with 31 publications and 932 citations.

The United States, the United Kingdom, Canada, Australia, and Japan were the most cited countries in rubrics research with 118269, 18668, 16968, 16458, and 5842 citations, respectively.

Sweden has the highest mean citation per article with 37.72, followed by Japan with 36.06 and Austria with 30.06, indicating that its rubrics research is highly cited relative to the number of publications.Indonesia has the sixth highest number of publications among the 25 countries, with 365 publications, but has a low TC/TP ratio of 3.41, suggesting that its rubrics research is relatively less cited.The table provides useful insights into the productivity and impact of rubrics research across different countries over the past century and a half.

Table (4): Top 25 most productive countries in rubrics research between 1850 and 2022

Rank	Country	TP	TC	TC/TP
1	United States	6316	118269	18.73
2	United Kingdom	732	18668	25.50
3	Australia	650	16458	25.32
4	Canada	591	16968	28.71
5	Spain	385	4672	12.14
6	Indonesia	365	1245	3.41
7	India	302	2010	6.66
8	Turkey	219	1393	6.36
9	China	191	2861	14.98
10	Germany	167	1750	10.48
11	Netherlands	165	2602	15.77
12	Japan	162	5842	36.06

13	New Zealand	148	1768	11.95
14	South Africa	144	1027	7.13
15	Italy	125	3096	24.77
16	France	100	2642	26.42
17	Brazil	94	1457	15.50
18	Taiwan	86	1539	17.90
19	Hong Kong	80	1084	13.55
20	Singapore	79	2071	26.22
21	Sweden	76	2867	37.72
22	Israel	71	1915	26.97
23	Switzerland	58	886	15.28
24	Ireland	57	1516	26.60
25	Austria	31	932	30.06

5.6. Subject-wise research contribution in rubrics research between 1850 and 2022

Table (5) describes the top 25 subjects contributing to rubrics research during 1850-2022. The findings show the number of research papers published in various subject areas, with Social Sciences having the highest number of papers (6582), followed by Arts and Humanities (2068), Medicine (1726), Engineering (1614), and Computer Science (1549).

The remaining subjects on the list have lower numbers of published papers, with subjects such as Psychology (749), Agricultural and Biological Sciences (601), Business, Management, and Accounting (571), and Nursing (435) having moderate levels of research activity. At the bottom of the list are subjects such as Library and information science (62), Dentistry (73), Chemical Engineering (76), Energy (76), Veterinary (78), Materials Science (84), Neuroscience (135), Chemistry (144), and Earth and Planetary Sciences (170), which have the lowest numbers of published papers.It is important to note that the number of published papers does not necessarily reflect the quality or impact of the research in each subject area. However, this data can provide insights into which fields have higher research activity and funding levels.

Table (5): Top 26 Subject areas in rubrics research between 1850 and 2022

Rank	Subject Area	TP
1	Social Sciences	6582
2	Arts and Humanities	2068
3	Medicine	1726
4	Engineering	1614
5	Computer Science	1549
6	Psychology	749
7	Agricultural and Biological Sciences	601
8	Business, Management and Accounting	571
9	Nursing	435
10	Mathematics	400
11	Environmental Science	382
12	Health Professions	364
13	Physics and Astronomy	338
14	Pharmacology, Toxicology and Pharmaceutics	284
15	Biochemistry, Genetics and Molecular Biology	280
16	Economics, Econometrics and Finance	271
17	Earth and Planetary Sciences	170
18	Decision Sciences	151
19	Chemistry	144
20	Neuroscience	135
21	Materials Science	84
22	Veterinary	78
23	Chemical Engineering	76
24	Energy	76
25	Dentistry	73
26	Library and Information Sciences	62

5.7. Mapping Co-occurrence of author keywords in rubrics research

Analyzing the co-occurrence of author keywords can provide valuable insights into the structure and content of the research literature in a particular field. It can be a useful tool for researchers, policymakers, and other stakeholders interested

in understanding the trends and patterns in research activity. The results of this analysis can be used to identify which topics or concepts are most frequently studied together in a particular field or set of publications. This can provide insights into the current state of research in the field and potential areas for future research. Minimum (25) occurrences of keywords considered for analysis. Out of the (21097) keywords, (82) meet the thresholds. All the selected 82 author keywords were grouped in 7 clusters, each representing a particular research theme as discussed below.

Education and learning methods (Cluster # 1): This cluster comprises 23 authors' keywords, namely active learning, assessment rubrics, authentic assessment, collaborative learning, communication skills, covid-19, critical thinking, dental education, engineering education, formative assessment, higher education, information literacy, instructional design, online learning, peer assessment, peer review, pharmacy education, problem-based learning, project-based learning, self-assessment, systematic review, teamwork, and training.

Professional development and skills (Cluster # 2): This clusters consist of 17 authors' keywords such as computational thinking, culture, curriculum, design, ethics, feedback, interprofessional education, Leadership, performance, problem-solving, professional development, program evaluation, science education, sustainability, teacher education, teacher training, and technology.

Learning and education research (Cluster # 3): This cluster includes 14 author keywords such as classification, clinical reasoning, collaboration, creativity, education, gender, India, learning analytics, machine learning, medical education, natural language processing, new species, students, and taxonomy.

Assessment and evaluation in nursing education (Cluster # 4): This cluster represents nine author keywords, including clinical judgment, communication, competency, evaluation, nursing education, reflection, rubric, simulation, and validation.

Assessment and accreditation in education (Cluster # 5): It consists of 7 author keywords, including accreditation, assessment, e-learning, grading, learning outcomes, quality, and rubrics.

Assessment and scoring in writing education (Cluster # 6): This cluster also has seven author keywords, namely measurement, performance assessment, reliability, scoring rubrics, validity, Writing, and writing assessment.

Pedagogy and innovation in education (Cluster # 7): This cluster represents five author keywords with experiential learning, innovation, learning, pedagogy, and teaching

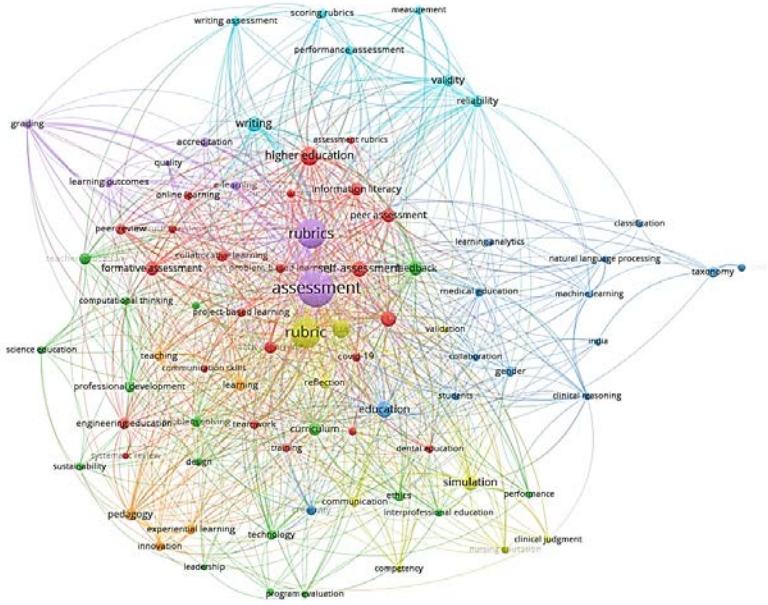

Figure (3): Mapping Co-occurrence of author keywords in rubrics research

5.8. Most cited research papers in rubrics research between 1850 and 2022

Table (6) analyzes the top 25 most cited research papers in rubrics between 1850 and 2022. The table shows that the paper with the highest citations is "Toward defining the preclinical stages of Alzheimer's disease: Recommendations from the National Institute on Aging-Alzheimer's

Association workgroups on diagnostic guidelines for Alzheimer's disease" by Sperling et al., published in 2011 with a total citation count of 4591(Sperling et al. 2011), followed by "A report: the definition and classification of cerebral palsy April 2006" by Rosenbaum P published in 2007 with 3163 citations(Rosenbaum et al. 2007) and "Mycotoxins" by Bennett JW published in 2008 with 2666 citations(Bennett and Klich 2003). The paper with the lowest total citations is "Quantification for staging sinusitis. The Staging and Therapy Group" by Lund et al., published in 1995 with a total citation count of 414 in the list(Lund and Kennedy 1995).

Notably, besides the top 25 global most-cited papers, it is important to mention the leading Library and Information Science (LIS) most-cited paper. “Interaction, facilitation, and Deep Learning in cross-cultural Chat: A case study” (2007) by Love E. and Edwards M.B is the most cited paper with 55 citations., followed by “The Invisible World of Intermediaries: A Cautionary Tale” (1999) with Angell K with 54 citations, “Forging inroads between libraries and academic, multicultural and student services” (2009) by Carbery A.; Leahy S with 40 citations, “Degrees of impact: Analyzing the effects of progressive librarian course collaborations on student performance” (2015) by Sikora L.; Fournier K.; Rebner J with 39 citations, and “Assessing library contributions to university outcomes: The need for individual student level data” (2012) Hoffman G.L with 37 citations. It is worth noting that the normalized TC column provides a more accurate comparison of the papers' impact, as it considers the number of years since the paper was published and the citation rate for papers published in the same year. Papers with a high normalized TC have a higher impact within their field. The analysis reveals that library and information papers received less attention than the other subjects in terms of total citations. The predominant topics of the most often cited scholarly works in the field of rubrics study within the Library and Information Science (LIS) domain, spanning from 1850 to 2023, encompass:

Information literacy and education: Numerous studies concentrate on enhancing, evaluating, and refining the information literacy abilities of students through diverse instructional techniques and technologies, such as rubrics and digital storytelling.

Collaborative Learning: Research highlights the need to combine libraries with academic and multicultural services to augment student learning experiences

Assessment and Evaluation: Numerous studies investigate the creation and verification of rubrics for evaluating academic achievement, writing skills, and critical thinking abilities.

The impact of libraries: Research on the ways in which libraries enhance academic outcomes, specifically through cooperation with courses and the data-driven evaluation of student performance.

These themes emphasize the crucial impact of rubrics on improving educational results and the deliberate utilization of libraries in academic environments.

Table (6): Top 25 most cited research papers in rubrics research between 1850 and 2022

TC	Title	Author	Year	TC/Year	Normalized TC
4591	Toward defining the preclinical stages of Alzheimer's disease: Recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease	Sperling RA	2011	382.58	147.39
3163	A report: the definition and classification of cerebral palsy April 2006	Rosenbaum P	2007	197.69	70.27
2666	Mycotoxins	Bennett JW	2003	133.30	58.16
2189	A framework of sustainable supply chain management: moving toward new theory	Carter CR	2008	145.93	72.34
1573	SEMANTIC DEMENTIA: PROGRESSIVE FLUENT APHASIA WITH TEMPORAL LOBE ATROPHY	Hodges JR	1992	50.74	25.26
128	On inhibition/disinhibition in developmental psychopathology: views from cognitive and personality	Nigg JT	2000	55.74	18.25

2	psychology and a working inhibition taxonomy				
1071	A contrarian view of the five-factor approach to personality description	Block J	1995	38.25	22.66
985	Experimental design and analysis and their reporting II: updated and simplified guidance for authors and peer reviewers	Curtis MJ	2018	197.00	111.54
959	Implicit memory: Retention without remembering	Roediger Iii Hl	1990	29.06	12.24
814	Evolutionary origins of stigmatization: the functions of social exclusion	Kurzban R	2001	37.00	17.40
723	Reward deficiency syndrome: a biogenetic model for the diagnosis and treatment of impulsive, addictive, and compulsive behaviors	Blum K	2000	31.43	10.29
658	Forcing cells to change lineages	Graf T	2009	47.00	29.04
646	Urban Policy Mobilities and Global Circuits of Knowledge: Toward a Research Agenda	Mccann E	2011	53.83	20.74
634	The use of scoring rubrics: Reliability, validity, and educational consequences	Jonsson A	2007	39.63	14.08
614	Antecedents of Information and System Quality: An Empirical Examination Within the Context of Data Warehousing	Nelson RR	2005	34.11	20.26
597	Migration and the Search for a Better Way of Life: A Critical Exploration of Lifestyle Migration	Benson M	2009	42.64	26.35
590	Service-dominant logic 2025	Vargo Sl	2017	98.33	55.98
576	Social support: a conceptual analysis	Langford CPH	1997	22.15	16.31

537	Cognitive development: children's knowledge about the mind	Flavell JH	1999	22.38	15.08
527	Incivility, social undermining, bullying…oh my!": A call to reconcile constructs within workplace aggression research	Hershcovis MS	2011	43.92	16.92
494	Stress and adaptational outcomes: The problem of confounded measures	Lazarus RS	1985	13.00	9.75
478	Structure-induced equilibrium and legislative choice	Shepsle KA	1981	11.38	12.31
468	The worth of a Songbird: Ecological Economics as a post-normal science	Funtowicz SO	1994	16.14	16.26
422	Parallel Developments in Aprotic and Protic Ionic Liquids: Physical Chemistry and Applications	Angell CA	2007	26.38	9.37
414	Quantification for staging sinusitis. The Staging and Therapy Group	Lund VJ	1995	14.79	8.76

5.9: Counry collaboration in producing rubrics research

Figure (5) examines the country's collaboration in producing research in rubrics. The study found that The United States is the most frequent collaborator with other countries, with Canada being the most common collaborator with 129 publications, the USA with the UK with 105 publications, the USA and Australia with 72 publications, USA and China with 55 publications and the UK with Australia with 52 publications. The USA and Mexico were the least collaborative countries among the top 25 listed countries, with 16 publications. Several collaborations involve geographically close countries, such as the US with Canada and Australia with Canada.The collaborations also reflect the global nature of research, with collaborations between the US and countries in Europe, Asia, and Africa.The frequency of collaborations suggests that language and cultural similarities, geographical proximity, and shared research interests often drive research collaborations.

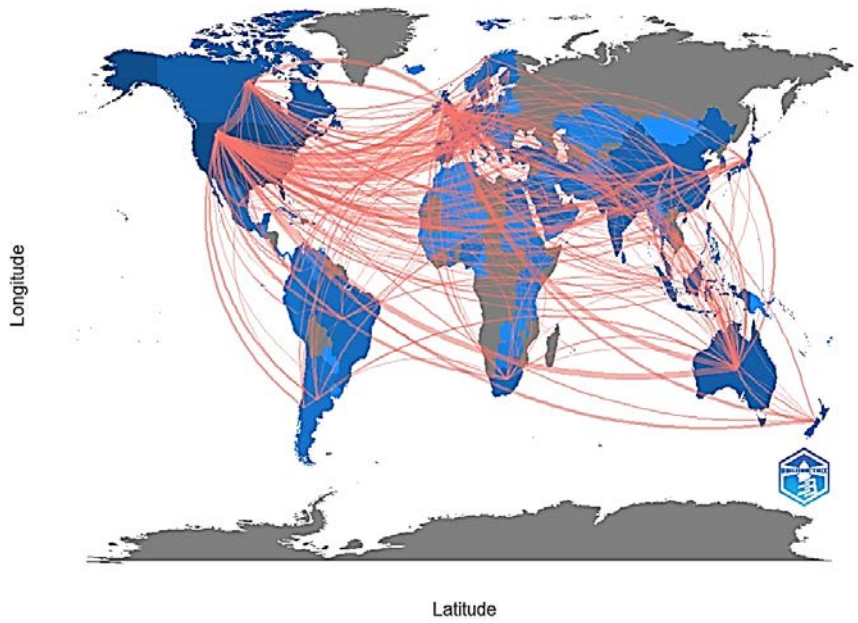

Figure (4): Country Collaboration Map

Conclusion

The present study comprehensively enlightened a bibliometric analysis of rubric research.The total analyzed dataset of 13651 publications was retrieved from the Scopus database between 1850 and 2023. The analysis revealed that 80% of research has contributed during the last 20 years, and publication has increased recently. The first research was published in 1850; the maximum contribution was in 2023, with 1,172 publications. The analysis shows that 2011 was the most cited year, followed by 2007 with 12062 citations, 2014 with 8663 citations, 2008 with 8382 citations, and 2017 with 8179 citations. The highest mean total citation per article was recorded in 1961, followed by 1990 with 78.38 TC/TP, 1955 with 76.50 TC/TP, and 2000 with 70.24 TC/TP.The most relevant sources in rubrics research between 1850 and 2023 are ASEE Annual Conference and Exposition, Conference Proceedings, American Journal of Pharmaceutical Education, Journal of Physics: Conference Series, Proceedings -

Frontiers in Education Conference, and Assessing Writing.The most productive authors in rubrics research are Kranov AA with 19 publications, Weston MA with 17 publications, and Panadero E with 15 publications. They are the top three authors in the field. The analysis found that the University of California, Purdue University, University of Pittsburgh, University of Pendidikan, and the University of Michiganare the leading organizations in the field.The United States, the United Kingdom, Canada, Australia, and Japan were the most productive countries in rubrics research, with the most publications and citations. As far as leading subject contribution in rubrics research between 1850 and 2022, it was highest in social sciences, followed by arts and humanities, medicine, engineering, and computer science. Analyzing the co-occurrence of author keywords in rubrics research can provide valuable insights into the structure and content of the research literature in a particular field. The results of this analysis can be used to identify which themes are most frequently studied together in the rubric research namely Education and learning methods (Cluster # 1), Professional development and skills (Cluster # 2), Learning and education research (Cluster # 3), Assessment and evaluation in nursing education (Cluster # 4), Assessment and accreditation in education (Cluster # 5), Assessment and scoring in writing education (Cluster # 6), and Pedagogy and innovation in education (Cluster # 7). The study found that The United States is the most frequent collaborator with other countries, with Canada being the most common collaborator with 129 publications, the USA with the UK with 105 publications, the USA and Australia with 72 publications, USA and China with 55 publications and the UK with Australia with 52 publications.

This bibliometric study on rubrics includes drawbacks, such as a dependence on data from the Scopus database, including only English language papers, and a concentration on particular keywords. The study may neglect more important terms and other databases. Future studies should look at using numerous citation databases and algorithms,non-English language, and employing novel scientific approaches. The study's technological complexities and replication on alternate databases such as Web of Science may yield useful insights. To further grasp the scholarly environment around rubrics, more research should be conducted into the technical complexities of highly cited publications and novel scientific methodologies.However, Educators and researchers in education benefit from this bibliometric rubric study because it provides insights into the existing

literature landscape, guides future research paths, and enhances the development and application of rubrics in educational contexts.

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