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*Corresponding author: Nikolaos Christidis, Department of Dental Medicine, Karolinska Institutet institution, 4064, SE-141 04 Huddinge, Sweden
E-mail: nikolaos.christidis@ki.se

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HIGHER EDUCATION | RESEARCH ARTICLE

Research focuses and trends in literacy within education: A bibliometric analysis

Yuh-Shan Ho¹, Essam Ahmed Al-Moraissi², Nikolaos Christidis^{3*} and Maria Christidis^{4,5}

Abstract: The purpose of this study was to conduct a bibliometric analysis including citation performance in the research topic of literacy within education, by using an innovative method including details of article title, author keyword, KeyWords Plus, and abstracts. This novel study is to our knowledge, the first of its kind within the field of literacy and can therefore provide valuable insights for professionals and others interested in literacy in terms of *who* and *what* to read, and *where* to focus. Data were retrieved 17 December 2022 from the Social Sciences Citation Index (SSCI) of Clarivate Analytics for studies published from 1992 to 2021. To evaluate research trends, the distribution of keywords in the article title and author-selected keywords was used. The search yielded 539 documents in SSCI, of which 489 were document-type “articles”. These articles were published in 142 journals. The analysis of the articles showed that “academic writing,” “higher education,” “writing,” and “assessment” are the most used keywords by the authors. The most frequently cited study was published in 1998 by Lea and Street. Most articles were published in English and originated in the USA and the UK. Most studies in the field of professional literacy are produced in the USA and UK, that is, countries with a long tradition of research in professional education and having English as the main language. Most publications are single-country productions because literacy, to a high extent, are local in nature.

Subjects: Higher Education; Continuing Professional Development; Education

Keywords: professional literacy; vocational literacy; occupational literacy; academic literacy; bibliometrics; education

1. Background

Literacy—in plural, concerns the actions of language, such as oral and written communication, reading, writing, and discussing absent or present text (Gee, 2015). The actions of language have different purposes and depend on context. In turn, contexts relate to a historical, sociocultural, and institutional organization of people—also called practices, that has a specific management of literacy, in terms of *what* people do, *when*, and *why* they do it (Gee, 2015; Karlsson, 2006). Thus, literacy is essential for the development of the individual and for the group in a specific context.

In the context of education, literacy refers to academic practices, but also to professional practices (Barton & Hamilton, 2012). Academic practices concern the formal structure of education, such as the adoption of the traditions of study, in terms of structure and content, for achieving a degree. The



professional, or vocational practice also has a certain tradition but is focused on the practices within a specific profession. While academic practices are more often related to higher education, professional practices are connected to both upper secondary level education, and higher education. This means that literacy in education is not delineated to a certain educational level, although these levels are in many ways related and highly relevant to each other.

Academic practice has, to a larger extent than professional practice, been scientifically scrutinized and historically more visible in the educational context. This may be because many, but not all professional/vocational educations were adopted in the academic context later on. For instance, in Sweden nursing education became an academic education in 1977 and in conjunction with that health sciences became an area scientifically acknowledged and explored (Heyman, 1995). However, in many cases the academic and professional/vocational practices co-exist (Lindberg et al., 2021). An example is professional higher education in which there is a double task (Lea & Stierer, 2000) of academic literacy and professional literacy, combining two practices and their respective “cultural ways of utilizing literacy” (Barton & Hamilton, 2012, p. 7). These cultural ways direct and inspire actions of language within this context. For instance, in dentistry and nursing there is an obligation to document patient treatments, which combines the two practices—the academic practice as the basis for decisions, and the professional practice as the context of execution (Karlsson & Nikolaidou, 2012; Lindberg et al., 2020). While inadequate academic literacy skills may have consequences for students’ educational outcomes, professional literacy skills, for instance in medicine, dentistry, and nursing, may risk patient safety (Bjerkar et al., 2021; Cilovic-Lagarija et al., 2021; Gunningberg et al., 2000; Karlsson et al., 2012; Lindberg et al., 2021; Odell et al., 1983; Tokede et al., 2016). Also, professional literacy is central in other professions such as construction, carpentry and concrete work for the security of the employed and for the production itself (Karlsson, 2003).

Thus, literacy in education has an incomplete overview concerning professional/vocational literacy, as it does not seem to be explored to the same extent as academic literacy. Researchers, that study the latter, experience a challenge in identifying existing research and knowledge gaps, so that their studies can complement the research field instead of just duplicate. Within social sciences (e.g., pedagogics, psychology, sociology, or economics) (Lau & Pasquini, 2004; Ledoux, 2002), which literacy in education relates to, but also in other areas there is a constant desire for increased knowledge and understanding of phenomena, and for providing the current best evidence or testable explanations and predictions. In the same way that literacy is essential for individual and group development in various contexts, is also the need to explore literacy in education to understand all aspects that are involved in this development. It is also this desire that has given a vast number of publications, rapidly increasing over the past century (Larsen & von Ins, 2010). However, it has resulted in an overwhelming mission for modern professionals to maintain and increase their knowledge based on the huge and growing amount of recent literature (Michel et al., 2022). Also, to search and find the most important or influential publications in the field of interest, is for the modern professional a task as scarce as hens’ teeth (Al-Moraissi et al., 2022; Michel et al., 2022).

Therefore, this article proposes bibliometrics, also known as citation analysis (Rubin, 2010) as a tool to help find the most relevant and suitable publications in the field of interest, that is, literacy in education. Bibliometrics can be used to summarize a research field of interest, providing a complete picture of the analyzed field, but can also show the dynamics and evolution of scientific knowledge within a research field by studying and interpreting developments within this field. In the best case, bibliometrics can provide future perspectives, such as of what studies are needed to complement knowledge gaps. Also, bibliometrics can be used to quantify the quality of publications and identify the impact of publications, research groups, and institutions in their field of research (Ho, 2012; Hoang et al., 2010), so that the researcher/s conducting a study use/s relevant references of research within the field. In addition, bibliometrics gives a comprehensive review of research trends within the field of interest and by investigating publication performance (Heldwein et al., 2010; Mogull & Smalheiser, 2017).

Taken together, the purpose of this study was to conduct a bibliometric analysis including citation performance in the research topic of literacy within education, by using an innovative method including details of article title, author keyword, KeyWords Plus, and abstracts.

Hopefully, this study will provide professionals working with and/or interested in literacy a sense of *who* and *what* to read, but also *where* there is a need for researchers and stakeholders to focus their critical energy.

2. Material and methods

Most bibliometric analyses analyze citation performance in a specific field by synthesis. However, this bibliometric analysis aimed to analyze and scrutinize the field of professional literacy using a more innovative method, as proposed by Ho's research group. In this case, the bibliometric analysis included details regarding a) article title, b) author keywords, c) *KeyWords Plus* (Jia et al., 2021); and d) abstracts (Wang & Ho, 2016; Zhang et al., 2010).

The Social Sciences Citation Index (SSCI) from Clarivate Analytics was used to obtain data for this bibliometric analysis (data extracted on 17 December 2022). Quotation marks (“”) and the Boolean operator “or” were used to ensure that at least one of the search keywords appeared in the TOPIC terms (i.e., title, abstract, author keywords, and *Keywords Plus*). This study used the following search keywords: “professional literacy”, “professional literacies”, “academic literacy”, “academic literacies”, “vocational literacy”, “vocational literacies”, “occupational literacy”, and “occupational literacies”.

Using only *Keywords Plus* to perform a search on a topic will result in irrelevant documents (Fu & Ho, 2015). Thus, to avoid these irrelevant documents in the bibliometric analysis, which could mislead the readers (Ho, 2020, 2021) a “front page” filter was implemented for the search. This “front page” filter was first proposed in 2012 by Ho's research group (Fu et al., 2012) and includes the document title, abstract, and author keywords. Using this filter, 539 documents were finally included from the SSCI for the publication years 1992 to 2021, which was 95% of the 570 documents found in the first search. Of the 539 documents found in the SSCI, 489 were articles.

The full record from the SSCI was verified and downloaded into Microsoft Excel 365. This record comprises the number of citations from each year for each document (Al-Moraissi et al., 2022). Subsequently, additional coding was performed manually (Ho et al., 2022; Kołakowski et al., 2022; Li & Ho, 2008) using following functions in Microsoft Excel 365. The functions used were (presented in alphabetical order) concatenate, COUNTA, filter, freeze panes, en, match, proper, rank, replace, sort, sum, and lookup. Finally, journal impact factors for 2021 (IF_{2021}) were downloaded from Journal Citation Reports (JCR) using Microsoft Excel 365. In the SSCI database the term “reprint author” is used. However, in the present study the term “corresponding author” was used instead (Chiu & Ho, 2007; Ho, 2014b).

As presented by Ho's research group, when it comes to single author, single institutional, or single country articles, they were labelled as follows: a) for single author articles, the authors were labelled both as first and corresponding author; b) for a single institutional or single country article, the institution as well as the country were classified as first as well as the corresponding institution or country, respectively. When it comes to multi-corresponding author articles on the other hand, all corresponding authors, institutions, and countries were considered for the bibliometric analysis (Ho, 2014b). Articles in SSCI with corresponding authors that did not display any affiliation but had only an address instead were then changed to affiliation names (Al-Moraissi et al., 2022). Finally, affiliations from England, Scotland, Wales, and Northern Ireland (Northern Ireland) were combined and classified as affiliations from the United Kingdom (UK) (Chiu & Ho, 2005).

2.1. Bibliometric analysis

In this bibliometric analysis, the following citation indicators were used to rank authors and articles: a) for a specific year, b) from the publication year to the end of the most recent year, and c) based on the average number of citations in correlation with the number of publications.

Thus, a) the citation indicator for a specific year (C_{year}) equals the number of citations from the Web of Science Core Collection in that specific year, in this case it was for the year 2021 (e.g. C_{2021}) (Ho, 2012); b) the citation indicator from the publication year to the end of the most recent year (TC_{year}) equals the total number of citations from the Web of Science Core Collection received from the year of publication until the end of the most recent year, in this case 2021 (e.g., TC_{2021}) (Wang, 2011); and c) the citation indicator based on the average number of citations in correlation to the number of publications (CPP_{year}) equals the average number of citations per publication (in this case for the year 2021: $CPP_{2021} = TC_{2021}/TP$), where TP equals the total number of articles/publications (Ho, 2013).

Furthermore, when it comes to the publication performance of 1) countries and 2) institutions, the following six publication indicators were used in the analysis (Hsu & Ho, 2014). The description of these six publication indicators is as follows: TP describes the total number of articles; IP describes the number of single-country articles (IP_C) or single institutional articles (IP_I); CP describes the number of international articles (CP_C) or inter-institutionally collaborative articles (CP_I); FP describes the number of first-author articles; RP describes the number of corresponding author articles; and SP describes the number of single-author articles.

Further, to evaluate which impact the publications had on: i) countries and ii) institutions, the following six publication indicators (CPP_{2021}) were used (Ho & Mukul, 2021). A description of these six publication indicators follows: $TP-CPP_{2021}$ is the outcome of the TC_{2021} of all articles divided to the total number of articles; IP_C-CPP_{2021} is the outcome of TC_{2021} of all *single-country* articles divided to all single-country articles, or when it comes to institutions it is called IP_I-CPP_{2021} and is the outcome of the TC_{2021} of all *single institutional* articles divided to all single institutional articles; CP_C-CPP_{2021} is the outcome of the TC_{2021} of all internationally collaborative articles divided by the number of internationally collaborative articles, or when it comes to institutions it is called CP_I-CPP_{2021} and is the outcome of the TC_{2021} of all inter-institutionally collaborative articles divided by the number of inter-institutionally collaborative articles; $FP-CPP_{2021}$ is the outcome for the TC_{2021} of all first-author articles divided by the number of first-author articles; $RP-CPP_{2021}$ is the outcome for the TC_{2021} of all corresponding-author articles divided by the number of corresponding-author articles; and $SP-CPP_{2021}$ is the outcome of the TC_{2021} of all single-author articles divided by the number of single-author articles.

Finally, to describe the characteristics of document types, the basic information of a document type in a specific research topic should be based CPP_{year} in combination with the average number of authors per publication, that is, $APP (= AU/TP)$ (Monge-Nájera & Ho, 2018). Furthermore, the use of TC_{2021} and CPP_{2021} is more accurate than using only the number of citations retrieved from the Web of Science Core Collection. This is because these variables can guarantee repeatability because of their invariability (Ho & Hartley, 2016). However, to display the development trends, impacts, and visibility of publications on a specific research topic, the correlation between TP (that is the annual number of articles) and their CPP_{year} (e.g., CPP_{2021}) were used (Ho, 2013).

3. Results

The purpose of this study was to conduct a bibliometric analysis including citation performance in the research topic of literacy within education. This was done by using an innovative method including details of article title, author keyword, KeyWords Plus, and abstracts. The bibliometric analysis is presented based on the following sections: 1) *Characteristics of: a) Document Types and b) Publication Outputs*; 2) *Web of Science Category and Journal*; 3) *Publication Performances*:

Countries and Institutions; 4) Citation Histories of the ten most frequently cited Articles; and 5) Research Foci.

3.1. Characteristics of document types

Table 1 describes in detail the 539 pedagogical documents found in the SSCI among the seven document types. Among the seven document types, reviews that included 13 documents displayed the greatest CPP_{2021} value, reaching 24. This CPP_{2021} value was found to be 1.2 times higher than that for the document type of articles. In this analysis, one must consider that documents can be categorized into two document types in the Web of Science Core Collection (Usman & Ho, 2020). For instance, in this analysis from the document type of proceedings papers four papers were also classified into the document type of articles. Therefore, the cumulative percentages exceeded 100% (Table 1). Regarding the publication count, this bibliometric analysis included 489 articles, which equals 91% of the total 539 documents found and retrieved by the search, with an APP of 2.0.

There are significant differences among different document types in terms of structure and content. However, the document type of articles is more homogenous, containing the parts of introduction, methods, results, discussion, and conclusion. Therefore, the document type of the articles was chosen for further analysis.

The 489 pedagogical articles were written in three different languages. The most frequently used language was English, with 468 articles (96% of 489 articles), followed distantly by Spanish (20 articles) and Afrikaans (one article). Not surprisingly, displayed more citations with a CPP_{2021} of 20, while non-English articles only reached a CPP_{2021} of 3.9.

3.2. Characteristics of publication outputs

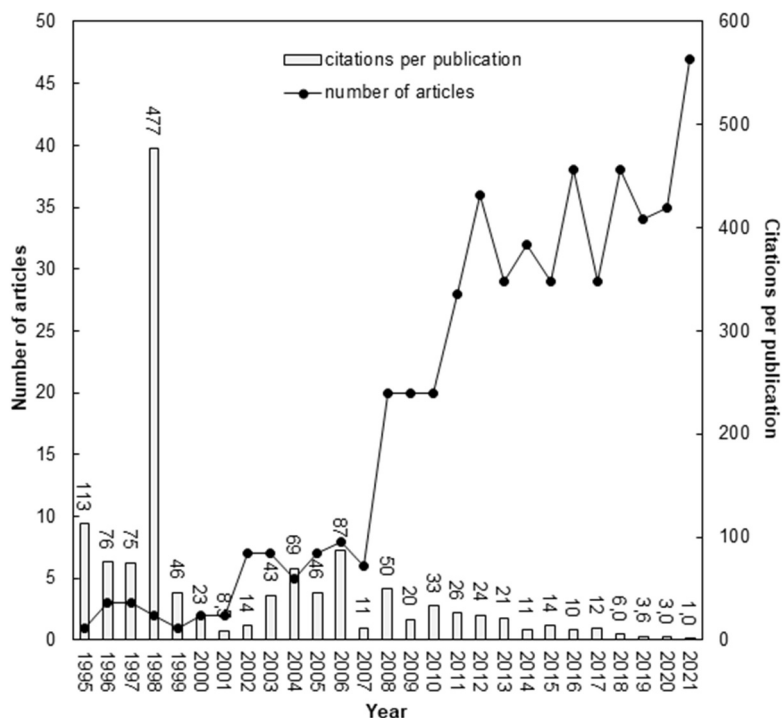
The CPP_{2021} of pedagogical articles was 20 ($TC_{2021}/TP=9,647/489$), with 865 being the maximum value for one article. The distribution of TP and CPP_{2021} (Ho, 2013) is shown in Figure 1. The number of articles fluctuated from 1995 to 2007, then increased sharply from six articles published in 2007 to 36 articles in 2012, and to as many as 47 articles in 2021. In 1998, only two articles were published, but they reached the highest CPP_{2021} of 477 in the field of pedagogical research. This can be explained by the fact that the highly cited article “Student writing in higher education: An academic literacies approach” (Lea & Street, 1998) reached a TC_{2021} of 856 (ranked 1st) and a C_{2021} of 59 (ranked 2nd). In 1995, one article also had a high CPP_{2021} , which is attributed to being the first article in pedagogical research entitled “Coping strategies of ESL students in writing tasks across the curriculum” (Leki, 1995) from the University of Tennessee in the USA with a TC_{2021} of 113 (ranked 11th).

Table 1. The citations and researchers based on the type of document

Document type	TP	%	AU	APP	TC ₂₀₂₁	CPP ₂₀₂₁
Article	489	91	959	2.0	9674	20
Book review	26	4.8	26	1.0	3	0.12
Review	13	2.4	24	1.8	317	24
Editorial material	8	1.5	16	2.0	67	8.4
Proceedings paper	4	0.74	8	2.0	76	19
Meeting abstract	2	0.37	2	1.0	0	0
Note	1	0.19	1	1.0	6	6.0

TP: number of publications; AU: number of authors; APP: average number of authors per publication; TC₂₀₂₁: total citations from the Web of Science Core Collection received from publication year until the end of 2021; CPP₂₀₂₁: average number of citations per publication ($CPP_{2021} = TC_{2021}/TP$); N/A: not available.

Figure 1. The total number of articles and the average number of citations per publication (CPP_{2021}) by year.



3.3. Web of science category and journal

In 2021, 142 journals published 489 articles related to pedagogical research in 25 different Web of Science categories in SSCI, including eight categories (32% of 25 categories) published one article and seven categories (28%) published two articles. Among these articles, 488 contained information on the category belonging to the SSCI. A total of 427 pedagogical-related articles (88% of the 488 articles) were published in the two productive categories, which are considered top categories: 1) education and educational research, containing 267 journals in 2021 with 312 articles; and 2) linguistics, containing 194 journals in 2021 with 207 articles. The remaining four categories published more 10 articles were educational psychology (17 articles), communication (14), nursing (12), information science, and library science (11).

Table 2 displays the top 10 most productive journals, which are those with more than 10 published articles. The journal *Teaching in Higher Education* ($IF_{2021} = 2.750$) published the most articles ($n = 30$), representing 6.1% of 489 articles. Among the top 10 productive journals, pedagogical articles published in *Written Communication* ($IF_{2021} = 2.447$) showed the greatest CPP_{2021} of 75. On the other hand, the articles in the *Journal of Adolescent & Adult Literacy* ($IF_{2021} = 1.188$) only had a CPP_{2021} of 6.4. The APP ranged from 1.3 in the *Written Communication* to 2.0 in the *Studies in Higher Education*. *Computers & Education* was the journal with the greatest IF_{2021} reaching 11.182, with only one published article, followed by *Computers in Human Behavior* ($IF_{2021} = 8.957$), with only one published article.

3.4. Publication performances: countries and institutions

There were three pedagogical articles (0.61% of 489 articles) without any information on affiliations in the SSCI. The remaining 486 articles were published by authors with registered affiliations in 38 countries, with a $TP-CPP_{2021}$ of 20, including 437 (90%) single-country articles. These were published by the authors from 29 different countries, with an SP_C-CPP_{2021} of 21. Furthermore, there were 49 (10%) internationally collaborative articles by authors from 26 different countries, with a CP_C-CPP_{2021} of 14. This demonstrates that international collaboration has decreased citations.

Table 2. The top 10 most productive journals

Journal	TP (%)	IF ₂₀₂₁	APP	CPP ₂₀₂₁
Teaching in Higher Education	30 (6.1)	2.750	1.8	19
Journal of English for Academic Purposes	29 (5.9)	2.811	1.7	18
Studies in Higher Education	22 (4.5)	4.017	2.0	69
Higher Education Research & Development	22 (4.5)	2.849	1.9	19
Journal of Second Language Writing	21 (4.3)	5.448	1.6	28
Southern African Linguistics and Applied Language Studies	20 (4.1)	0.560	1.8	9.3
Journal of Adolescent & Adult Literacy	17 (3.5)	1.188	1.5	6.4
English for Specific Purposes	15 (3.1)	2.417	1.9	23
Language and Education	13 (2.7)	2.432	1.6	12
Written Communication	11 (2.2)	2.447	1.3	75

TP, total number of articles; %, percentage of articles in all articles; IF₂₀₂₁, journal impact factor in 2021; APP, average number of authors per publication; CPP₂₀₂₁, average number of citations per publication (TC₂₀₂₁/TP).

The top 10 most productive countries (e.g., countries with more than 10 published articles) are described in detail in Table 3. The USA dominated the six publication indicators: a TP of 135 (28%), an IP_C of 123 (28%), a CP_C of 12 (24%), an FP of 127 (26%), an RP of 128 (26%), and an SP of 59 (27%). The UK and South Africa were also ranked at the top with a CP_C of 12. The UK has a TP of 80, an IP_C of 68, a CP_C of 12, an FP of 73, and an RP of 75, with a TP-CPP₂₀₂₁ reaching 41, an IP_C-CPP₂₀₂₁ reaching 42, a CP_C-CPP₂₀₂₁ of 34, an FP-CPP₂₀₂₁ of 43, and an RP-CPP₂₀₂₁ of 43. For SP-CPP₂₀₂₁ USA ranked the highest, reaching 33.

Concerning institutions, 355 pedagogical articles (69% of 486 articles) were found to originate from single institutions, with an IP_I-CPP₂₀₂₁ of 20. The remaining 151 articles (31%) were institutional collaborations with a CP_I-CPP₂₀₂₁ of 20. This demonstrates that institutional collaboration did not increase citations.

The bibliometric characteristics of the 13 most productive institutions (e.g., those with six or more published articles) are presented in Table 4. Three of the top 13 most productive institutions are in the USA and South Africa, two in the UK and Australia, and one in Canada, China, and Sweden. The University of Cape Town in South Africa was ranked at the top of five of the six analyzed publication indicators. These were as follows: a TP of 25 (5.1% of 486 articles), an IP_I of 24 (7.2% of 335 single-institution articles), an FP of 24 (4.9% of 486 first-author articles), an RP of 24 (4.9% of 486 corresponding author articles), and an SP of 13 (5.9% of 222 single-author articles). Open University in the UK was the most frequent collaborative partner in pedagogical research, with a CP_I of six articles (3.9% of 152 inter-institutionally collaborative articles). Among the top 13 productive institutions presented in Table 4, open universities in the UK had a TP of 15, a CP_I of 6, an FP of 14, and an RP of 15, and were ranked highest with a TP-CPP₂₀₂₁ of 125, a CP_I-CPP₂₀₂₁ of 253, an FP-CPP₂₀₂₁ of 134, and an RP-CPP₂₀₂₁ of 125. King's College London in the UK had an IP_I of 5, ranked highest with an IP_I-CPP₂₀₂₁ of 46. The University of Hong Kong in China has an SP of 5, ranked highest with an SP-CPP₂₀₂₁ of 39.

3.5. Citation histories of the 10 most frequently cited articles

Table 5 shows the top 10 most frequently cited articles in the field of pedagogical research. Five of the top ten articles contained the search keywords in their titles, eight articles in their abstracts, and two articles in their keywords.

Table 3. Top 10 most productive countries with six publication and citation indicators

Country	TP	TPR (%)	CPP	IPcR (%)	CPP	CPcR (%)	CPP	FPR (%)	CPP	RPR (%)	CPP	SPR (%)	CPP
USA	135	1 (28)	25	1 (28)	25	1 (24)	24	1 (26)	24	1 (26)	24	1 (27)	33
UK	80	2 (16)	41	2 (16)	42	1 (24)	34	3 (15)	43	2 (15)	43	2 (19)	26
South Africa	78	3 (16)	11	3 (15)	11	1 (24)	8.8	2 (15)	11	3 (15)	11	3 (18)	12
Australia	61	4 (13)	14	4 (12)	15	4 (20)	11	4 (11)	15	4 (11)	15	4 (7.7)	21
China	30	5 (6.2)	16	5 (4.6)	21	4 (20)	6.2	5 (5.3)	17	5 (5.6)	17	5 (5.0)	25
Canada	23	6 (4.7)	16	6 (4.3)	19	8 (8.2)	1.3	6 (4.3)	18	6 (4.3)	18	6 (4.5)	20
Sweden	20	7 (4.1)	7.7	7 (3.4)	7.0	6 (10)	10	7 (3.5)	6.6	7 (3.7)	7.4	6 (4.5)	10
Spain	18	8 (3.7)	11	8 (3.2)	13	8 (8.2)	4.8	7 (3.5)	12	8 (3.5)	12	8 (2.7)	19
New Zealand	15	9 (3.1)	10	10 (2.5)	11	8 (8.2)	6.0	9 (2.7)	11	9 (3.1)	10	9 (2.3)	17
Chile	14	10 (2.9)	3.5	9 (2.7)	2.5	13 (4.1)	10	9 (2.7)	3.1	10 (2.9)	3.5	10 (1.4)	0.33

TP: number of total articles; TPR (%): total number of articles and the percentage of total articles; IPCR (%): rank and percentage of single-country articles in all single-country articles; CPCR (%): rank and percentage of internationally collaborative articles in all internationally collaborative articles; FPR (%): rank and the percentage of first-author articles in all first-author articles; RPR (%): rank and the percentage of corresponding-author articles in all corresponding-author articles; SPR (%): rank and the percentage of first-author articles in all first-author articles; CPP: the total TC2021 of all articles per the total number of articles (TP); CPP: the total TC2021 of all single-country articles per the number of single-country articles (IPC); CPP: the total TC2021 of all internationally collaborative articles per the number of internationally collaborative articles (CPC); CPP: the total TC2021 of all first-author articles per the number of first-author articles (FP); CPP: the total TC2021 of all corresponding-author articles per the number of corresponding-author articles (RP); CPP: the total TC2021 of all single-author articles per the number of single-author articles (SP).

Table 4. Top 13 productive institutions with six publication and citation indicators with six articles or more

Institution	TP	TPR (%)	CPP	IPiR (%)	CPP	CPiR (%)	CPP	FPR (%)	CPP	RPR (%)	CPP
Univ Cape Town, South Africa	25	1 (5.1)	14	1 (7.2)	15	62 (0.66)	10	1 (4.9)	15	1 (4.9)	15
Open Univ, UK	15	2 (3.1)	125	2 (2.7)	40	1 (3.9)	253	2 (2.9)	134	2 (3.1)	125
Univ Hong Kong, China	11	3 (2.3)	22	3 (2.1)	29	4 (2.6)	9.0	3 (1.9)	24	3 (1.9)	24
Stockholm Univ, Sweden	10	4 (2.1)	10	5 (1.5)	13	2 (3.3)	7.6	4 (1.4)	9.4	4 (1.4)	12
Kings Coll London, UK	7	5 (1.4)	87	5 (1.5)	46	20 (1.3)	190	10 (1.0)	46	10 (1.0)	46
Univ Calif Irvine, USA	7	5 (1.4)	6.1	7 (1.2)	4.0	8 (2.0)	9.0	5 (1.2)	6.8	5 (1.2)	6.8
Univ Pretoria, South Africa	7	5 (1.4)	6.4	7 (1.2)	4.5	8 (2.0)	9.0	10 (1.0)	4.2	10 (1.0)	4.2
Penn State Univ, USA	6	8 (1.2)	7.5	7 (1.2)	8.3	20 (1.3)	6.0	5 (1.2)	7.5	5 (1.2)	7.5
Univ British Columbia, Canada	6	8 (1.2)	16	13 (0.90)	28	8 (2.0)	3.3	14 (0.82)	22	13 (0.82)	22
Univ KwaZulu Natal, South Africa	6	8 (1.2)	5.3	4 (1.8)	5.3	N/A	N/A	5 (1.2)	5.3	5 (1.2)	5.3
Univ Massachusetts, USA	6	8 (1.2)	19	13 (0.90)	4.7	8 (2.0)	33	5 (1.2)	19	5 (1.2)	19
Univ South Australia, Australia	6	8 (1.2)	10	13 (0.90)	7.0	8 (2.0)	12	5 (1.2)	10	5 (1.2)	10
Univ Sydney, Australia	6	8 (1.2)	11	30 (0.60)	12	4 (2.6)	11	14 (0.82)	13	13 (0.82)	13

TP: total number of articles; TPR (%): total number of articles and percentage of total articles; IPIR (%): rank and percentage of single-institution articles in all single-institution articles; CPIR (%): rank and percentage of inter-institutionally collaborative articles in all inter-institutionally collaborative articles; FPR (%): rank and percentage of first-author articles in all first-author articles; RPR (%): rank and percentage of corresponding-author articles in all corresponding-author articles; TP-CPP: the total TC2021 of all articles per the total number of articles (TP); IPI-CPP: the total TC2021 of all single-institution articles per the number of single-institution articles (IPI); CPI-CPP: the total TC2021 of all inter-institutionally collaborative articles per the number of inter-institutionally collaborative articles (CPI); FP-CPP: the total TC2021 of all first-author per the number of first-author articles (FP); RP-CPP: the total TC2021 of all corresponding-author articles per the number of corresponding-author articles (RP); N/A: not available.

Table 5. The top 10 most frequently cited articles

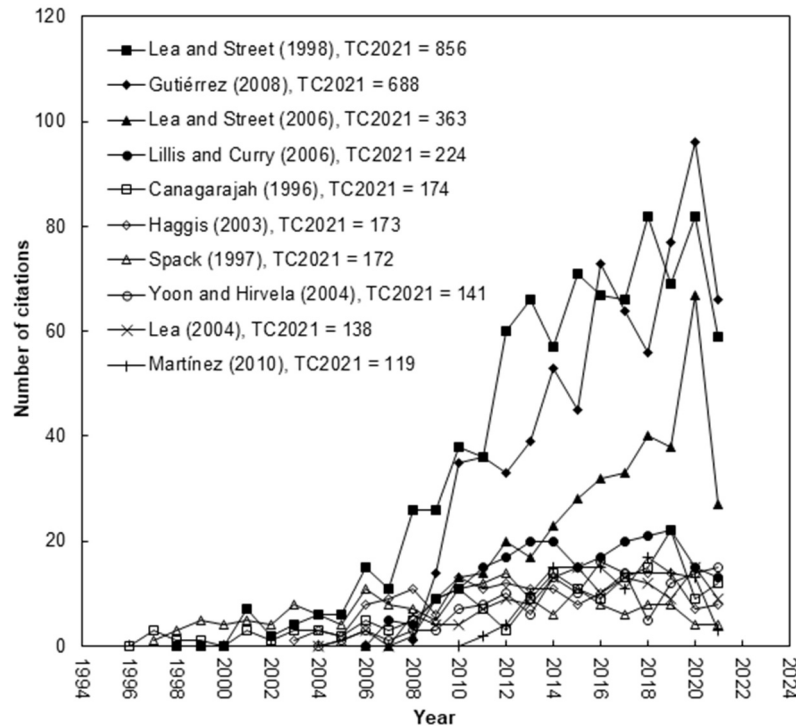
Rank (TC ₂₀₂₁)	Rank (C ₂₀₂₁)	Title	Country	Reference
1 (856)	2 (59)	Student writing in higher education: An academic literacies approach	UK	Lea and Street (1998)
2 (688)	1 (66)	Developing a sociocritical literacy in the Third Space	USA	Gutiérrez (2008)
3 (363)	4 (27)	The “academic literacies” model: Theory and applications	UK	Lea and Street (2006)
4 (224)	14 (13)	Professional academic writing by multilingual scholars: Interactions with literacy brokers in the production of English-medium texts	UK, USA	Lillis and Curry (2006)
5 (174)	15 (12)	“Nondiscursive” requirements in academic publishing, material resources of periphery scholars, and the politics of knowledge production	USA	Canagarajah (1996)
6 (173)	33 (8)	Constructing images of ourselves? A critical investigation into “approaches to learning” research in higher education	UK	Haggis (2003)
7 (172)	69 (4)	The acquisition of academic literacy in a second language: A longitudinal case study	USA	Spack (1997)
8 (141)	8 (15)	ESL student attitudes toward corpus use in L2 writing	USA	Yoon and Hirvela (2004)
9 (138)	27 (9)	Academic literacies: A pedagogy for course design	UK	Lea (2004)
10 (119)	103 (3)	<i>Spanglish</i> as literacy tool toward an understanding of the potential role of Spanish-English code-switching in the development of academic literacy	USA	Martinez (2010)

R: rank in articles; TC₂₀₂₁: the total citations from Web of Science Core Collection received from publication year until the end of 2021; C₂₀₂₁: the number of citations of an article in 2021 only.

Regarding citation histories, the top 10 cited articles are illustrated in Figure 2. Four articles were not only the most frequently cited within the top 10 TC₂₀₂₁, but these four articles were also found to have the greatest impact in the year 2021 in the field of pedagogical research. They were:

- (1) Developing a sociocritical literacy in the Third Space (Gutiérrez, 2008)
 The article was published in the *Reading Research Quarterly* by Kris D. Gutiérrez from the University of California, Los Angeles, USA, with a C₂₀₂₁ score of 66 (rank 1st in pedagogical research) and a TC₂₀₂₁ score of 688 (rank 2nd). This article had the greatest impact on pedagogical research in 2021.
- (2) Student writing in higher education: An academic literacy approach (Lea & Street, 1998)
 The article was published in *Studies in Higher Education* by Mary R. Lea from the Open University in the UK and Brian V. Street from King’s College London in the UK. This article had a C₂₀₂₁ of 59 (rank 2nd) and a TC₂₀₂₁ of 856 (rank 1st).
- (3) The academic literacies model: Theory and applications (Lea & Street, 2006)
 The article was published in *Theory into Practice* by Mary R. Lea from the Open University in the UK and Brian V. Street from King’s College London in the UK. This article had a C₂₀₂₁ score of 27 (rank 4th) and a TC₂₀₂₁ score of 363 (rank 3rd).
- (4) ESL students’ attitudes toward corpus use in L2 writing (Yoon & Hirvela, 2004)
 The article published in the *Journal of Second Language Writing* by Hyunsook Yoon and Alan Hirvela from Ohio State University in the USA. Finally, this article had a C₂₀₂₁ of 15 (rank 8th) and a TC₂₀₂₁ of 141 (rank 8th).

Figure 2. The citation histories of the top 10 most frequently cited.



3.6. Research foci

The 17 author keywords in pedagogical-related research that were most frequently used, as well as the distribution of these keywords in three sub-periods (1995–2003, 2004–2012, and 2013–2021) are shown in Table 6. Except for the search words, the most frequently used keywords were: “academic writing,” “higher education,” “writing,” and “assessment.” “Systemic functional linguistics,” “instructional strategies,” “media literacies,” “literacies,” and “theoretical perspectives” were getting popular topics in the last two decades.

4. Discussion

The outcome of this unique bibliometric analysis on literacy within education indicates that the most common keywords are “academic writing,” “higher education,” “writing,” and “assessment”. However, there seems to be a change during the last two decades moving towards the following keywords: “systemic functional linguistics,” “instructional strategies,” “media literacies,” “literacies,” and “theoretical perspectives” which could be an indicator of the direction of present and ongoing research in this field. Not surprisingly, most studies in the field of professional literacy are initiated, and their following articles produced, in the USA and UK. These countries have a long tradition of research in professional education, have many citizens, good financial resources, and English as their main language (Ahmad et al., 2020; Catalá-López et al., 2020; Lea & Street, 1998; Leki, 1995). Finally, the article with the greatest impact is the one that proposes the present framework in the field of literacy (Lea & Street, 1998), which is a point of departure for subsequent studies. In addition to the previous framework, the present framework suggested by Lea and Street (1998) is a development that also considers issues of identity, institutional relationships of power and authority in relation to various student writing practices in a university context. Therefore, it may be more relevant for understanding contemporary student writing compared to traditional models and approaches. Taken together, this research field provides professionals with a limited view on literacy within education and that there is a need for researchers to initiate new national, international or multinational collaborations

Table 6. Top 17 most frequently used author keywords

Author keywords	TP	1995–2021 R (%)	1995–2003 R (%)	2004–2012 R (%)	2013–2021 R (%)
academic literacy	120	1 (31)	1 (67)	1 (31)	1 (31)
academic literacies	72	2 (19)	N/A	2 (22)	2 (18)
academic writing	39	3 (10)	N/A	3 (10)	3 (10)
higher education	31	4 (8.1)	N/A	4 (6.6)	4 (8.8)
writing	22	5 (5.8)	N/A	7 (4.7)	5 (6.3)
assessment	13	6 (3.4)	N/A	10 (3.8)	8 (3.3)
literacy	12	7 (3.1)	2 (33)	6 (5.7)	26 (1.8)
plagiarism	12	7 (3.1)	N/A	4 (6.6)	26 (1.8)
systemic functional linguistics	12	7 (3.1)	N/A	30 (1.9)	6 (3.7)
instructional strategies	11	10 (2.9)	N/A	66 (0.94)	6 (3.7)
international students	11	10 (2.9)	N/A	10 (3.8)	14 (2.6)
media literacies	11	10 (2.9)	N/A	30 (1.9)	8 (3.3)
second language writing	11	10 (2.9)	N/A	13 (2.8)	10 (2.9)
academic discourse	10	14 (2.6)	N/A	10 (3.8)	17 (2.2)
genre	10	14 (2.6)	N/A	13 (2.8)	14 (2.6)
literacies	10	14 (2.6)	N/A	30 (1.9)	10 (2.9)
theoretical perspectives	10	14 (2.6)	N/A	30 (1.9)	10 (2.9)

TP: number of articles containing search keywords; R: rank in a period; N/A: not available.

including non-English speaking countries, various cultures and educational systems, but also countries with less good financial resources. Also, findings show that there is a need for more studies concerning professional literacy, which would contribute to a more whole understanding of literacy within education.

4.1. Characteristics of document types

In the field of professional literacy, the dominant publication language was English, with 96% of all publications, followed by Spanish (4%). From one point of view, this is not surprising since research concerning literacy is conducted mainly in countries where English is a primary language, such as the USA, South Africa, the UK, and Australia. For instance, the first published paper concerning literacy was from the University of Tennessee in the USA (Leki, 1995), and the most cited from Milton Keynes in the UK (Lea & Street, 1998). However, other countries, such as Sweden and China, were among the most productive countries with publications in English. There are several explanations for this finding. First, since 1990, English has been considered a lingua franca in science (Garfield, 1990), and since there is a wish to make research findings internationally visible and available, there has been a shift to English in science (Kirchik et al., 2012). Second, Sweden, for instance, is among the countries with better economic rankings that tend to publish more (Lai et al., 2017; Pena-Cristobal et al., 2018) and in international journals (Lillis et al., 2010). This accounts not only for studies in social sciences that are more local in nature (Gingras & Heilbron, 2009), but is also consistent with other bibliometric studies within professions research, such as medicine (Al-Moraissi et al., 2022; Al-Sharaee et al., 2022; Alkhatari et al., 2022). Thus, this could be explained by the greater resources and possibility of conducting research. Third, globalization and internationalization result in collaborative projects in which publications in languages other than English are difficult to conduct, as different scientists with different languages start to collaborate (Kirchik et al., 2012). Fourth and finally, since international journals use English as the

language of publishing (Lillis et al., 2010), scientists are driven to publish in English to make their findings visible to a larger audience and thus cited by more.

Articles in English are cited five-fold more than non-English articles, which is also the case for other professional research fields, such as medicine (Al-Moraissi et al., 2022; Al-Sharaee et al., 2022; Alkhatari et al., 2022). Another similarity with the field of medicine is that the average citations per publication type (CPP) in the field of professional literacy is greater for the publication type “reviews” than “articles” (1.2 times in favor of reviews), which is in consistency with, for example, insomnia (1.4 times) (Jallow et al., 2020), fracture nonunion (1.3 times) (Giannoudis et al., 2021)

4.2. Characteristics of publication outputs

Ho (2013) proposed using the correlation between TP and CPP_{year} as a tool to display development trends and the impact publications have in their specific field of research. In the research field of professional literacy, there was no specific publication pattern; however, from 2007 to 2021, there was a sharp increase in the number of publications. One explanation for this increase could be an article published in 2006 by Lea and Street that shifted the perspective on literacy, teaching and learning, and pedagogical research (Lea & Street, 2006). This article highlights the academic literacy model for curricular and instructional design, departing from the epistemological examples of two academic programs. The model focuses on an understanding of the variety and specificity of institutional practices and students’ process of sense-making, as opposed to focusing on student deficits. Similar patterns have been found in new research topics, such as bacterial nanocellulose (Ho et al., 2021), fluorescent carbon nanoparticles (Yang & Ho, 2019), and metal-organic frameworks (Ho & Fu, 2016), in which the greatest CPP_{2021} was found in earlier years, and the number of publications increased sharply.

One interesting finding was that only two articles were published in 1998, but they reached the highest CPP_{2021} of 477. This high CPP_{2021} was attributed to the article by Lea and Street (1998), with a total of 856 citations (TC_{2021}). This article can be considered the most important publication in the field of professional literacy, and it is not surprising but a rather expected finding since it presents a more nuanced description of student writing in higher education that became more significant for understanding academic literacy than previous models and approaches. The presented academic literacy framework was the basis for subsequent research on literacy. The second most important article was published in 1995 and was attributed to the first published paper in the field of professional literacy (Leki, 1995).

4.3. Web of science category and journal

As previously described by Giannoudis et al. and Ho and Mukul, the characteristics of a research topic in Web of Science categories are based on CPP_{year} and APP (Giannoudis et al., 2021; Ho & Mukul, 2021). As expected, the top and most productive Web of Science category, accounting for 88% of all articles, was “education and educational research” and “linguistics”, since professional literacy is closely related to both education and linguistics. Literacy, especially in higher education, refers to both academic and professional practices (Barton & Hamilton, 2012), that is, actions of language such as reading, writing, and discussing (absent or present) text it (Gee, 2015; Karlsson, 2006). Following this reasoning, it is easy to understand why the following Web of Science categories are “educational psychology,” “communication,” and “nursing.”

This also accounts for the authors’ choice of journals, since the journals with the most publications were *Teaching in Higher Education*, *Journal of English for Academic Purposes*, and *Studies in Higher Education*. Based on the scope of these journals, researchers can reach out to the audience that is interested in the field of professional literacy, but also to educators teaching professional literacy.

4.4. Publication performances: countries and institutions

In contrast to other professional research fields such as medicine, international collaborations in the field of professional literacy seem to result in fewer citations than single-country articles (Al-Moraissi et al., 2022). This is most probably due to the fact that literacy studies in general are locally investigated (Gingras & Heilbron, 2009), in contrast to research in the field of medicine (Al-Moraissi et al., 2022; Al-Sharaee et al., 2022; Alkhutari et al., 2022). This is because there are great variations within and between languages, such as dialects, chronolects, sociolects, and idiolects (Norrby & Ljungmark, 2007).

As previously mentioned, it is not surprising that the USA was the dominant country when it comes to productivity, distantly followed by the UK since the field of professional literacy has its roots in the USA and UK, where the article being attributed the first publication in the field was from the University of Tennessee in the USA (Leki, 1995), and the most cited article was from Milton Keynes in the UK (Lea & Street, 1998). Historically, literacy research has focused on reading and was conducted in the USA during the 1870s (Martin et al., 2012). Further, these two countries were expected to be the most dominant, since almost half of the most productive institutions in the world are based in the USA and the UK. Except for Sweden, the most productive countries and institutions are located in countries with a large population (more than 25 million people) with a large possible scientific population. The USA, Canada, the UK, and Sweden are countries with better availability of financial resources, which could be another explanation, since it has been shown that low-to middle-income countries have fewer scientific articles published (Ahmad et al., 2020; Catalá-López et al., 2020).

4.5. Citation histories of the 10 most frequently cited articles

Periodically, the Web of Science Core Collection updated the total number of citations. Therefore, it is recommended to directly use the total number of citations from the Web of Science Core Collection from the publication year to the end of the most recent year (in this case 2021) from the database. To improve the validity of bibliometric analysis, it is possible to obtain reliable and unbiased results (Wang, 2011). This is especially important because it shows which articles have the greatest impact on their research field. Thus, the number of citations of a “highly cited” article may not always be high (Ho, 2014). This is because one recently published article can have an extreme increase in citations immediately after publication, whereas another can have a long citation history with several citations from the past.

In this analysis, the study “Developing a sociocritical literacy in the Third Space” by Gutiérrez (2008) seems to have the greatest impact since it was more recently published, but have already reached the second highest TC_{2021} (Gutiérrez, 2008), with only the older study “Student writing in higher education: An academic literacies approach” by Lea and Street (1998) is slightly ahead (Lea & Street, 1998). These two are ranked at the top because they propose perspectives concerning students’ literacy other than the preceding models and approaches. Lea and Street (1998) highlight an academic literacy framework that includes the complex nature of writing practices, while Gutiérrez (2008) focuses on students’ development through literacy. Far behind, but still on third place thus also having a great impact is the study by Lea and Street (2006) “The academic literacies model: Theory and applications” (Lea & Street, 2006). This study argues, as a continuation of the article published in 1998 (Lea & Street, 1998), for an academic literacy model (called the framework in 1998) that focuses on previous models and approaches.

4.6. Research foci

With regard to the research focus in a specific field, it has previously been described by Wang and Ho that the most important information can be retrieved from an article’s title, abstract, author keywords, and *KeyWords Plus*. Based on this, an analysis of the distribution of words in an article is a useful tool for identifying research foci and development trends (Wang & Ho, 2016; Zhang et al., 2010).

The analysis of the distributions of words in article titles, article abstracts, author keywords, and *KeyWords Plus* can therefore be used to minimize some limitations, such as an incomplete sense of individual words in titles and abstracts, small samples provided by author keywords, and a possible indirect relationship between *KeyWords Plus* and the research topic of interest (Fu & Ho, 2013). Based on this, the present study used the article title, article abstract, author keywords, and words in *KeyWords Plus* for the analysis of research in the field of professional literacy in the three sub-periods (1995–2003, 2004–2012, and 2013–2021) to show rough research trends (Wang & Ho, 2016). Not surprisingly, among the most commonly used author keywords in this analysis were the initial keywords “academic writing,” “higher education,” “writing,” and “assessment” since they attract the audience in form of both researchers and educators in professions education. This also accounts for the keywords “systemic functional linguistics,” “instructional strategies,” “media literacies,” “literacies,” and “theoretical perspectives” that have been introduced the last two decades.

4.7. Study limitations

Although bibliometrics or citation analysis can be considered adequate and sensible techniques for article recognition and evaluation, there are some limitations that need to be addressed. Bibliometrics does not consider the occurrence of self-citation or citations that give a negative view of the published article (MacRoberts & MacRoberts, 1989). Bibliometric analysis cannot consider the level of contribution made by each author in the articles, thus giving all authors equal values. Bibliometrics cannot provide any information regarding the quality of the published articles included in the analysis, although it is well known that the quality varies greatly among different articles (Chen et al., 2019). Finally, regardless of the quality and/or content of an article, the most recently published articles are always in a disadvantageous position, since it takes approximately 10 years before the impact of an article in its research field (Callaham et al., 2002).

5. Conclusion

This bibliometric analysis, that is the first of its kind, indicates that most studies in the field of professional literacy are initiated and their following articles are produced in the USA and UK. These countries have a long tradition of research in professional education and having English as the main language. Most publications are single-country productions since literacy and professional literacy, to a high extent, are locally investigated. Even though academic literacy and professional literacy are two different practices, the three most common keywords are “academic writing,” “higher education,” “writing,” and “assessment”. This to attract an audience in form of both researchers and educators in professions education. Among the more recent publications from the last two decades, the following keywords have been introduced “systemic functional linguistics,” “instructional strategies,” “media literacies,” “literacies,” and “theoretical perspectives” that points out the direction of present research in this field. Finally, the article with the greatest impact is the one by Lea and Street (1998), which proposes another framework than the previously existing ones, that is, the academic literacy framework. This framework highlights writing practice as complex and comprises students’ basic skills, interaction between student and teacher (expectations, understanding, and teacher-response), and institutional level, such as the modular system, assessments, and procedures concerning student writing. Hopefully, based on this study, researchers, stakeholders, and educators in professional education will have information of *who* and *what* to read, but also be stimulated to outline future research projects on academic but foremost on professional literacy. The results from this study can also be used as a basis to initiate new international or multinational collaborations based on *where* there is a need to focus and address their research questions.

Author details

Yuh-Shan Ho¹
ORCID ID: <http://orcid.org/0000-0002-2557-8736>
Essam Ahmed Al-Moraissi²
ORCID ID: <http://orcid.org/0000-0002-3649-9662>
Nikolaos Christidis³

E-mail: nikolaos.christidis@ki.se
ORCID ID: <http://orcid.org/0000-0002-8199-7863>
Maria Christidis^{4,5}
ORCID ID: <http://orcid.org/0000-0001-6804-6855>
¹ Trend Research Centre, Asia University, Taichung, Taiwan.

- ² Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Thamar University, Thamar, Yemen.
- ³ Division of Oral Diagnostics and Rehabilitation, Department of Dental Medicine, Karolinska Institutet, Huddinge, Sweden.
- ⁴ The Institute of Health Sciences, The Swedish Red Cross University, Huddinge, Sweden.
- ⁵ Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, Huddinge, Sweden.

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Authors' contributions

NC, MC, and EA contributed to the conceptualization, methodology, and reviewing and writing of the original draft. YH contributed to data collection, analysis, and review of the manuscript. Finally, all authors read and revised the manuscript prior to submission.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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