

Bibliometric Analysis of the Studies on Map Literacy in the Field of Education*

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Abstract

In this study, it is aimed at examining the academic studies on map literacy in the field of education and educational research by bibliometric analysis. In the study, which was designed as a case study from qualitative research designs, a literature review was conducted using the keyword "map literacy" in the WoS database. Academic studies published in 30 years between 1992 and 2022 were included in the research by selecting 'document title, abstract, keyword' as criteria in the scan. As a result of the search, bibliometric data of 601 publications in the category of education and educational research were used as the data set in the study. Cross-country co-authorship analysis, keywords used and network analysis of keywords in the publications were visualised using the WoSviewer (Version 1.6.16) program. According to the findings, the highest number of publications on map literacy in education was made in 2020. The most frequently published language is English, and the most common type of academic study is article. Queensland University of Technology is the leading institution where the authors who publish on map literacy work or are supported. Eight universities from Turkey are also among the institutions where the authors are working or supported. The most common source of publication on map literacy is Inted Proceedings journal and the country is the United States of America. There is an increase in the number of citations for studies on map literacy after 2004. The most frequently used keywords in the publications on map literacy are literacy and digital literacy.

Keywords: Map literacy, Map, Web of Science, Educational research, Bibliometric analysis.

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From the first civilisations to the present day, many maps have been made in different forms, with different drawing techniques and materials. The first examples of map use in history are simple drawings drawn on cave walls. In time, these simple drawings started to be drawn on clay tablets and tree barks and were included in the portable class. Old maps give striking results about the ways of perceiving the world in the past (Duman and Girgin 2011). Considering that the first map examples were tree barks, clay tablets or more primitive depictions drawn on cave walls, great changes have occurred in both map making techniques and usage purposes from past to present. Today, maps produced with modern surveying techniques and computer programmes and used in many fields have become indispensable for our age. Maps enable individuals to perceive the change and continuity in the country and the world, location and settlement features concretely (Karakuş and Oğuz, 2013). In other words, maps transfer the information about the place to the user graphically as a whole. Thus, maps turn into a tool that presents pages of information to users on a single visual. Good map knowledge and skills and good map literacy are of great importance in order to understand and interpret this information provided by maps correctly and to choose the right maps according to the purpose of use. It is possible to transfer or gain this knowledge, skills and literacy to individuals in the right way and to transform them into experiences through education.

With the beginning of education, people begin to recognise and perceive the environment better. Buğdaycı and Bildirici (2009) state that the general purpose of teaching is to provide students with key information rather than filling their minds with very detailed information, to teach them the ways of providing and using information at necessary times and places, to gain knowledge, skills and value judgements. In this context, it can be said that one of the general aims of education and training is to gain skills. Today, it is clearly stated that skill-based education should be included in the curricula shaped according to the constructivist education approach adopted philosophically in our country (Koç, Ergün, and Sarigül, 2021). For this reason, in the Turkish education system, course-specific skills are included in the curricula of the relevant course. There are 8 skills in the curriculum for the geography course. The skills included in the current geography curriculum are map skills, observation skills, fieldwork skills, questioning skills, table-graph-diagram creation and interpretation skills, time perception skills, change and continuity perception skills and evidence use skills. All these skills are not specific to geography alone. However, when they are used to finding answers to geographical problems and questions, they are perceived as geographical skills.

Maps have a very important place in geography, which is a science of space. Haggett (1995) defines geography as 'the art of what can be mapped'. Bilgin (1996) states that cartography, which is the science of mapping, forms a part of mathematical geography in classical geography works, and geographers are experts who use and interpret the large-scale maps produced by cartographers as a basis and create new, special and general distribution maps for their own studies. In this context, using maps, which is one of the tools of geography, is an important stage in teaching geography science (Aksoy ve Ünlü, 2012). In geography, a narrative without a map causes students to have difficulty understanding subjects and leads them to memorization (Artvinli & Dönmez, 2020).

Although maps are one of the basic tools of geography science or course, today, with the widespread use of maps in many areas from education to daily life, they have become one of the most used resources in daily life outside the classroom environment or educational environments. For example, in the simplest terms, maps are used in planning a journey from one city to another city or to reach the destination we want to reach in an unfamiliar city. For this reason, it can be said that map skills are one of the most important skills that individuals should acquire in today's world. Within the scope of map skills, individuals can both present the information they obtain about the land as an output by creating a map and obtain information about the land by reading and interpreting maps. Thanks to this skill, it will be easier to understand the spatial distribution. People with map skills can easily read maps and create new maps. All of these skills are expressed as map literacy.

Map literacy can be defined as being able to interpret, analyse and evaluate the map by making use of the colours, signs, symbols and legend on the map and being able to create maps suitable for the purpose of use. Map literacy skills may vary according to the age and grade level of the student. A child attending primary school can learn to transfer the roads he/she passes every day to the paper plane on the way to school with the sketch drawing he/she learnt in the social studies course. This skill will help him perceive his environment better. When he/she reaches high school, the environment he/she wants to reach will expand. He/she can explore a city with the map literacy skills he/she acquired in geography class without the help of someone else. Thanks to online or digital map services, they can easily find out which vehicle they need to take to reach a place, which stop they need to get off at, how much time they need to spend, touristic areas, food and beverage centres, lakes, rivers, mountains, the location of institutions and organisations, and even in today's technology. For this, it is very important to know the colours, symbols, legend and which map to use. This issue is of great importance, as the ability to read maps is also involved in the acquisition of geographical skills (Artvinli & Dönmez, 2020).

Heinich, Molenda and Russel (1989) also state that the primary literacy of the 21st century is visual literacy, which is defined as the power to make sense of visual messages and to create messages in a similar way. Maps are one of the primary tools that visually reflect the information about the space. Maps, which are one of the tools for expressing the relationship between human and space in a visual way (Sarigül, 2021), have an important role in perceiving the space. Therefore, maps are indispensable and important materials in geography, which is a spatial science, and it is not an option but a necessity to use maps to provide students with this skill within the framework of visual literacy mentioned by Heinich, Molenda and Russel in geography education. For this reason, when the current geography curriculum is examined, it is seen that from the 9th grade onwards, at each grade level, in all units, map skills are included in the framework of map literacy. As a matter of fact, when the 2018 Geography Curriculum is examined, the number of objectives that include map skills, excluding the objectives related to map knowledge, is 46. This figure corresponds to approximately 1/3 of all learning outcomes in the geography curriculum. Considering that maps and map skills are included in history, social studies, life science courses as well as geography courses, it becomes clear how important the teaching of map knowledge and map skills has an important place in the educational process for map literacy.

As one of the 21st century's basic skills, literacy can be defined as the ability to read, perceive and comprehend the read items. Map literacy, on the other hand, can be defined as the ability to interpret, analyse and evaluate the map based on the colours, signs, symbols and map legend on the map, and to create maps suitable for the purpose. As stated above, it is very important to gain map literacy skills in today's world. As a matter of fact, many studies on map literacy in literature clearly reveal this situation. Kuzey (2017) in his research 'Map and Direction Literacy in Life Science Curricula from the Proclamation of the Republic to the Present', he studied map literacy at primary school level. Görmez (2021) in his study titled 'A Study on the Map Literacy Skill Competencies of Secondary School Students' tried to reveal the competencies of 8th grade students on map literacy skills. Kartal and Koç (2017) in their study titled 'Investigation of Secondary Education (9th Grade) Students' Map Literacy Levels in Terms of Various Variables' studied the map literacy of secondary school students. Duman and Girgin (2007) tried to determine the attitudes of higher education level students towards map literacy in their study titled 'Opinions of Faculty of Education Students on Map Literacy'. This situation shows that studies on map literacy have been carried out at every level of education. However, it is important to evaluate these studies with a holistic perspective and to determine the trends to draw a path for future studies on map literacy. In this context, the problem of the study can be expressed as how are the trends of the studies on map literacy in the field of education? In line with this problem situation, this study aims to bibliometrically analyze the studies on map literacy in the field of education and educational research. In line with this purpose, answers to the following questions were sought.

1. What is the numerical distribution of academic studies on map literacy in the field of education according to years?
2. What is the distribution of academic studies on map literacy in the field of education according to publication of languages?
3. What is the distribution of academic studies on map literacy in the field of education according to publication types?
4. What is the distribution of the authors of map literacy publications in the field of education according to the institutions where they work or where these studies are supported?
5. How is the distribution of academic studies on map literacy published in the field of education according to the countries where they were conducted?
6. How is the citation distribution of academic studies on map literacy published in the field of education according to years?
7. How is the citation analysis of academic studies on map literacy published in the field of education?
8. What is the most frequently used keyword network status in academic studies on map literacy published in the field of education?
9. How is the reference co-citation network distribution in academic studies on map literacy published in the field of education?

Method

Research Model

This study, which aims to examine the scientific studies on map literacy in the field of education in terms of bibliometric criteria and to reveal the current situation, was carried out as a case study from qualitative research designs. “Case study is an empirical research method that ‘studies a current phenomenon within its real life framework (content), where the boundaries between the phenomenon and the content it is in are not clear, and where more than one source of evidence or data is available.’” (Yin 1984 as cited in Yıldırım & Şimşek 2013).

Data Collection Instruments

In this study, Web of Science (WoS) database was used as a data collection tool. WOS is the oldest citation index for the sciences, created by ISI (Thomson Reuters Institute of Scientific Information) in 1964 (Garfield 1964 as cited in Birkle et al., 2020). The WOS database is a citation index of scientific publications including journals, books and data compilations (Birkle et al., 2020). According to the information on the Web of Science website, there are more than 37,000 journals and more than 171,000,000 records, and it also contains various data from different citation databases (SCI, SSCI, SCI-Expanded, AHCI, ESCI...), including a lot of information collected from journals, conferences, reports, books and book series (Yeşiltaş & Evcı 2021). WoS was used as a data collection tool in this study because of its rich content and data sets that allow bibliometric analysis.

In order to obtain data in accordance with the purpose of this study, a search was made on the Web of Knowledge web page using the keyword ‘map literacy’ in all WoS databases. In order to interpret the data obtained in a holistic manner, a search was carried out to cover 30 years between 1992 and 2022, starting from the date of the oldest publication on the subject researched in the database. As a result of the search, a total of 1,964 publications were reached. Considering that new studies will be conducted, the bibliometric data of 601 publications in the category of education and educational researches were used as a data set in the study after the existing studies belonging to the year 2023, the year in which the search was carried out, were removed.

Analyze of Data

The data obtained from the WoS database were analysed by bibliometric analysis technique according to certain criteria and statistical inferences were made. Bibliometric analysis is a field of study based on numerical data and can be defined as the examination of outputs such as published books, journals and articles with mathematical and statistical techniques (Pirtchard, 1969 cited in Kankam et al. 2020). According to Yılmaz (2017), bibliometric analysis is the analysis of certain characteristics of documents such as journal, subject, number of authors, year of publication, and publication information. Bibliometric studies reveal the current status, orientation and development of studies in the literature related to a branch of science (Üstdiken & Pasadeos, 1993).

In line with the aim of the research, a total of 601 works published on map literacy in the category of education and educational research between 1992-2022 were examined and

categorised in terms of bibliometric indicators. Percentage and frequency distributions of these categorised data such as the number of publications, language, type of publication, distribution of publications according to countries, etc. were calculated with MS Excel application. Social network analyses of the keywords of 601 studies related to map literacy were performed with VOSviewer (Version 1.6.16) package programme, one of the bibliometric analysis tools. This package programme is a software tool used to create maps based on network data.

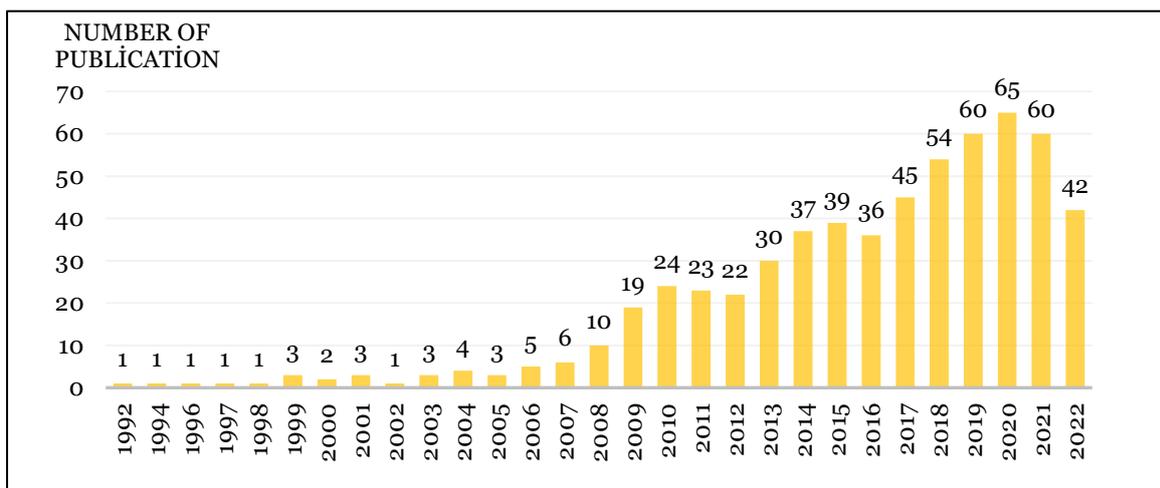
Findings

Number of Publications

According to the data obtained from the WoS database, it was determined that the number of studies published on map literacy in the category of education and educational research was at a very low level before 2007, increased in general terms between 2007-2020, and decreased after 2020 (Figure 1).

Figure 1

Distribution of Studies on Map Literacy in the Category of Education and Educational Research By Years (Wos, June, 2023).



As can be seen in figure 1, the highest number of publications on map literacy in the category of education and educational research were made in 2020 ($f=65$), 2019 and 2021 ($f=60$), 2018 ($f=54$), respectively. The least publications were made in 1992, 1994, 1996, 1997, 1998 and 2002 ($f=1$).

It is thought that the increase in the number of studies on map literacy in the last 20 years is due to the widespread use of maps in all areas of daily life (health sector, defence industry, urban and intercity transportation, etc.). In addition, the popularity of various mapping software such as digital maps (Google Earth, Yandex, HERE Maps, etc.) and Geographic Information Systems (GIS) (ArcGIS, MapInfo, GeoEngineering, etc.) is also thought to be effective in this increase.

Publication Language

Academic studies on map literacy in the category of education and educational research in the WoS database were prepared in 10 different languages (Table 1). When Table 1 is

analysed, it is seen that the studies on map literacy in education and educational research are mostly published in English (f=559). After English, it is seen that the most publications are in Portuguese (f=15) and Spanish (f=10). The least number of publications were made in languages such as Latvian, Serbian, Slovak, Ukrainian with one publication each.

Table 1

Distribution of Studies on Map Literacy in the Category of Education and Educational Research According to Publication Language (WoS, June, 2023).

Language	f	%
English	559	93,01
Portuguese	15	2,50
Spanish	10	1,66
Chinese	5	0,83
Russian	5	0,83
French	3	0,50
Latvian	1	0,17
Serbian	1	0,17
Slovak	1	0,17
Ukrainian	1	0,17
Total	601	100,00

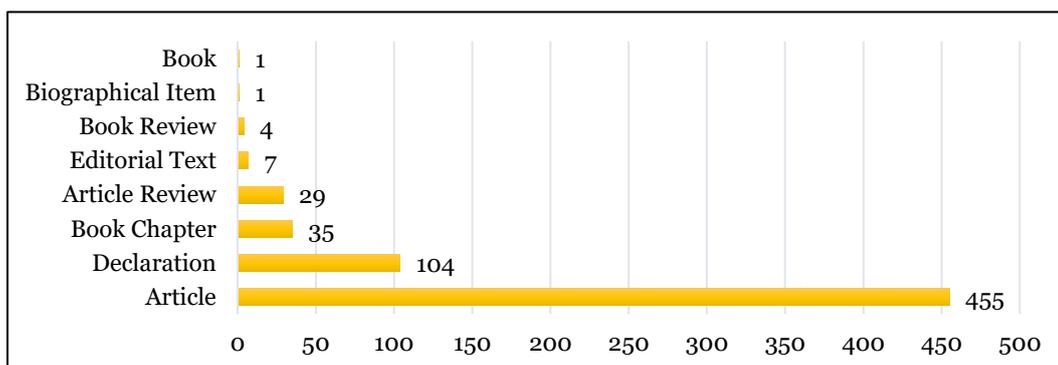
It can be said that the fact that English is the language with the highest number of publications on map literacy is due to the widespread use of English as a language of science and the fact that the majority of the journals scanned in the WoS database publish in this language (Yeşiltaş and Yilmazer 2021). In the category of education and educational research in the WoS database, there was no study published in Turkish among the studies on map literacy between 1992 and 2022. The reason for this situation is thought to be due to the fact that the resources published in Turkish, which include studies on map literacy, were not scanned in the WoS database in the years subject to this research.

Publication Type

The distribution of academic studies published on map literacy in the category of education and educational research in the WoS database according to the type of publication is as shown in figure 2.

Figure 2

Distribution of Studies on Map Literacy in the Category of Education and Educational Research By Publication type (WoS, June, 2023).



According to figure 2, a significant portion (f=455) of the studies on map literacy in education and educational research are articles. This is followed by papers (f=104), book chapters (f=35), article reviews (f=29), editorial texts (f=7), book reviews (f=4), biographical items (f=1) and books (f=1), respectively.

The total of the distribution of the studies on map literacy in figure 2 according to publication types is 636. It is thought that the reason why the distribution according to publication type is higher than the number of publications (f=601) is due to the fact that the studies on map literacy in the category of paper may also be published in different categories such as article or book chapter.

Author Affiliations

In the WoS database, the number of institutions where the authors publishing on map literacy in the category of education and educational research work or are supported is quite high (f=694), and the first 10 institutions are shown in table 2 according to the ranking made.

Table 2

Distribution of Authors working on Map Literacy in Education and Educational Research According to the Institutions They are Affiliated or Supported (WoS, June, 2023).

Affiliations	f	%
Queensland University Of Technology Qut	12	1,997
State University System of Florida	12	1,997
N8 Research Partnership	11	1,83
Rluk Research Libraries UK	10	1,664
University Of California System	10	1,664
University System Of Georgia	9	1,498
Pennsylvania Commonwealth System Of Higher Education Pcshe	8	1,331
University Of New South Wales Sydney	8	1,331
Indiana University System	7	1,165
University Of Illinois System	7	1,165

When table 2 is analysed, it is seen that Queensland University of Technology and Florida State University System (f=12) are the leading institutions where the authors who published on map literacy in education and educational research work or are supported. These institutions are followed by N8 Research Partnership (f=11), RLUK Research Libraries and the University of California System (f=10), University System of Georgia (f=9), Pennsylvania State System of Higher Education and the University of New South Wales Sydney (f=8), Indiana University System and the University of Illinois System (f=7).

In the category of education and educational research, there are 8 universities from Türkiye among 694 institutions where the authors who published on map literacy work or are supported, and a total of 10 publications on map literacy were made or supported in these universities. Among these 8 universities in Türkiye, Marmara University and Ondokuz Mayıs

University ranked first. A total of two publications were made in both universities and one publication was made in the other universities (Table 3).

Table 3

Author Institutions Working on Map Literacy in the Category of Education and Educational Research Institutions in Türkiye (WoS, June, 2023).

Affiliations in Türkiye	f	%
Marmara University	2	0,333
Ondokuz Mayıs University	2	0,333
Adnan Menderes University	1	0,166
Atatürk University	1	0,166
Balıkesir University	1	0,166
Bülent Ecevit University	1	0,166
Karadeniz Teknik University	1	0,166
Sakarya University	1	0,166

Countries

In the WoS database, the number of countries where academic studies on map literacy were published in the category of education and educational research is 59. Since the number of countries where the number of publications is high, according to the ranking in table 4, the first 10 countries with the highest number of publications are included.

Table 4

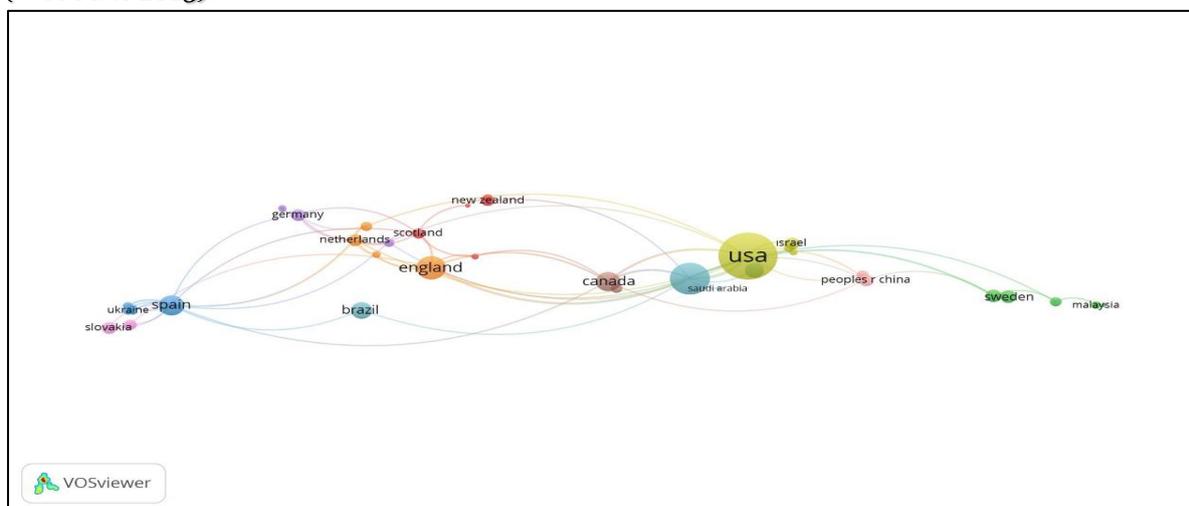
Distribution of Studies on Map Literacy in the Category of Education and Educational Research According to Countries (WoS, June, 2023).

Ranking	Countries/Regions	f	%
1	Usa	172	28,6
2	Australia	81	13,4
3	England	46	7,6
4	Spain	33	5,4
5	Canada	32	5,3
6	Brazil	24	3,9
7	South Africa	20	3,3
8	Sweden	13	2,1
9	Taiwan	13	2,1
10	Germany	12	1,9
19	Türkiye	9	1,4

According to the data in table 4, the United States of America (f=172), Australia (f=81), England (f=46), Spain (f=33) and Canada (f=32) are the leading countries where map literacy is published in education and educational research. In these countries, the number of publications on map literacy constitutes more than 50% of the total number of publications. Türkiye ranks 19th in the category of countries with 9 publications (1.4%). The graph of cooperation between countries for the co-authorship analysis of publications on map literacy is given in figure 3. Each node in the figure shows the countries, the size of the node reflects the published studies, and the thickness of the lines between the nodes reflects the extent of co-operation.

Figure 3

Cross-country Cooperation in Co-authorship Analysis of Academic Publications on Map Literacy (Wos June 2023).



In order to increase the readability of the figure 3, when the number of publications cited in the programme is selected as at least 2, these countries are grouped under 11 groups and there are 69 connection lines between them. According to the number of links, Spain has the highest number of links (f=13). USA (f=12), Australia (f=12), England (f=8) and Canada (f=7) follow this country respectively. In the cross-country co-authorship analysis, no link was found for Turkey.

Sources

According to the data in the WoS database, since the number of sources in which the studies on map literacy in education and educational research are published is very high (f=391), the first 10 sources with the highest number of publications are given in table 5. According to table 5, it is seen that Inted Proceedings (f=19) is the leading source of studies on map literacy in the category of education and educational research. This is followed by Edulearn Proceedings (f=16), English Teaching Practice And Critique (f=12) and Reading Teacher (f=10) respectively.

Table 5

Distribution of Studies on Map Literacy in the Category of Education and Educational Research According to the Sources of Publication - Top Ten Sources- (Wos June 2023).

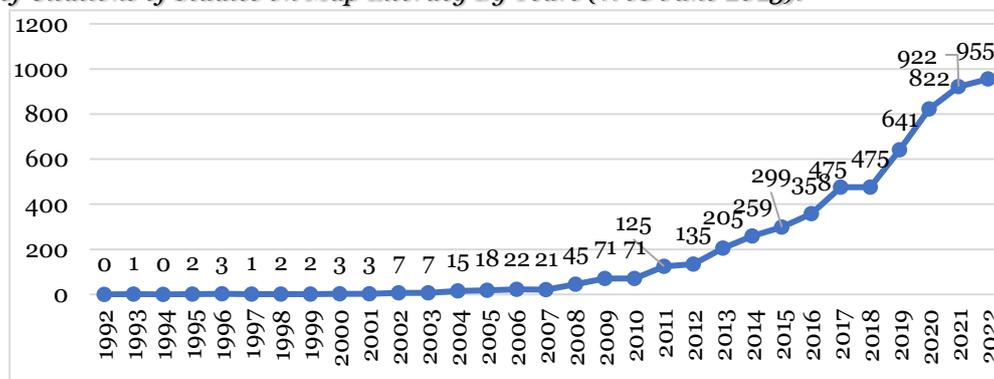
Publication Sources	f	%
Inted Proceedings	19	3,161
Edulearn Proceedings	16	2,662
English Teaching Practice And Critique	12	1,997
Reading Teacher	10	1,664
Computers Education	9	1,498
International Journal Of Bilingual Education And Bilingualism	9	1,498
Journal Of Early Childhood Literacy	9	1,498
Iceri Proceedings	8	1,331
Journal Of Adolescent Adult Literacy	7	1,165
Communications In Computer And Information Science	6	0,998

Citation Distribution by Year

According to the data obtained from the WoS database, it was determined that there was no citation information in 1992 and 1994 for academic studies published on map literacy in the category of education and educational research, while the number of citations between 1993 and 1995-2003 remained at a very low level. In this period, the number of citations of studies on map literacy is below 10. Since 2004, there has been a general increase in the number of citations of academic studies on map literacy (Figure 4). Since 2004, it is thought that the increase in the number of citations is due to the increase in the number of studies on map literacy issues with the popularity of digital maps and map software and the easier access to studies on map literacy due to the development of communication technologies.

Figure 4

Number of Citations of Studies on Map Literacy By Years (WoS June 2023).



Citation Analysis

The figure of the most cited publications in academic studies on map literacy in the category of education and educational research in the WoS database is given in figure 5.

Figure 5

The Most Cited Publications in Scientific Studies on Map Literacy (The Intensity of Citations Varies From Blue to Yellow (Wos, June, 2023)).



According to the data obtained from the WoS database, since there are many studies on map literacy in the category of education and educational research (f=145), the first 10 studies were emphasised. The most cited publication among these studies (f=277) is by Leander, K. M., Phillips, N. C., & Taylor, K. H. 'The Changing Social Spaces of Learning: Mapping New Mobilities' published in 2010. 'Science as the centre of a coherent, integrated early childhood curriculum' (f=205) by French, L. in 2004 and 'The effect of talk and writing on learning science: An exploratory study.' (f=190) by Rivard, L. P., & Straw, S. B. in 2000 (Table 6).

Table 6

Top 10 Most Cited Publications in Scientific Studies on Map Literacy (Wos, June, 2023).

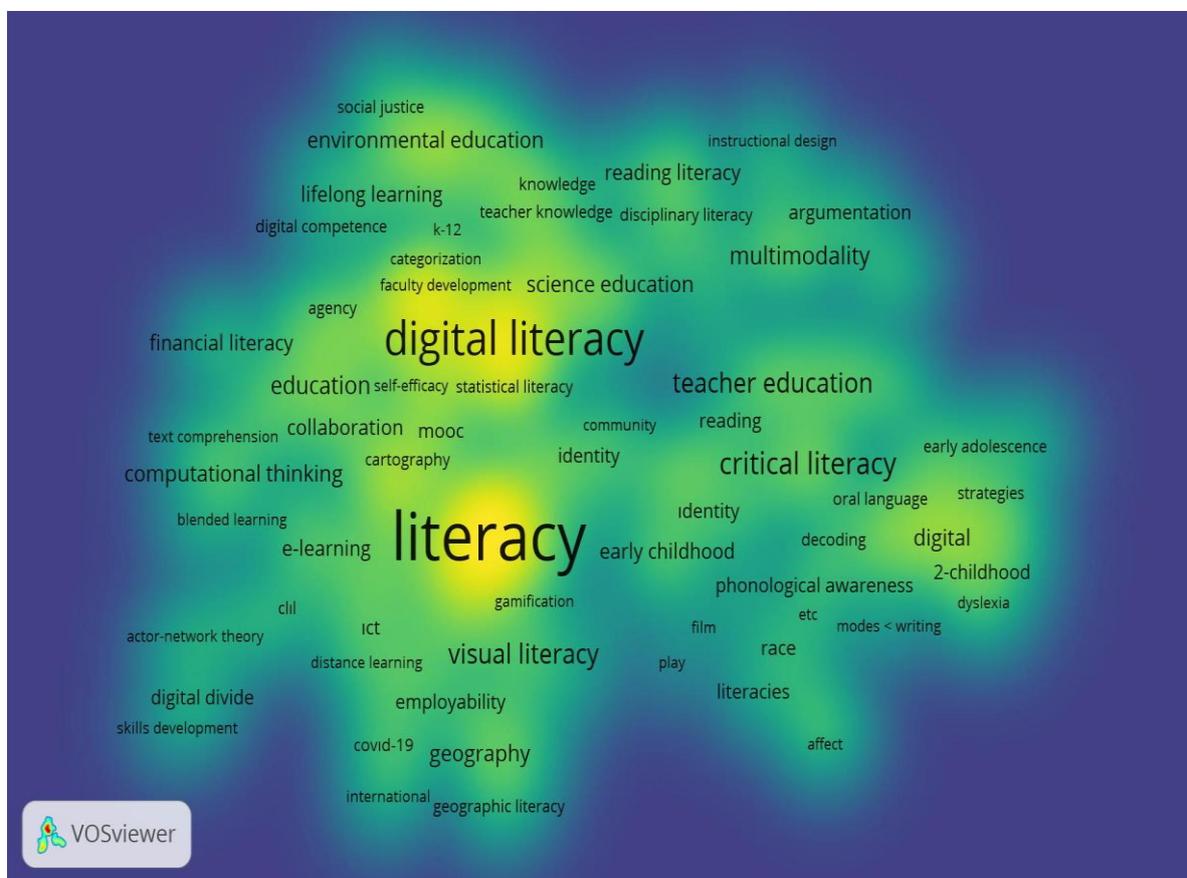
Ranking	Publication imprint	Citation Count
1	Leander, K. M., Phillips, N. C., & Taylor, K. H. (2010). The Changing Social Spaces of Learning: Mapping New Mobilities. <i>Review of Research in Education</i> , 34(1), 329-394. https://doi.org/10.3102/0091732X09358129	277
2	French, L. (2004). Science as the center of a coherent, integrated early childhood curriculum. <i>Early Childhood Research Quarterly</i> , 19(1), 138-149.	205
3	Rivard, L. P., & Straw, S. B. (2000). The effect of talk and writing on learning science: An exploratory study. <i>Science education</i> , 84(5), 566-593.	190
4	Zohar A. & Barzilai S.(2013) A review of research on metacognition in science education: current and future directions, <i>Studies in Science Education</i> , 49:2, 121-169,	149
5	Duncan, R. G., & Reiser, B. J. (2007). Reasoning across ontologically distinct levels: Students' understandings of molecular genetics. <i>Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching</i> , 44(7), 938-959.	147
6	Janssen, J., Stoyanov, S., Ferrari, A., Punie, Y., Pannekeet, K., & Sloep, P. (2013). Experts' views on digital competence: Commonalities and differences. <i>Computers & education</i> , 68, 473-481.	145
7	Meyer, O., Coyle, D., Halbach, A., Schuck, K., & Ting, T. (2015). A pluriliteracies approach to content and language integrated learning—mapping learner progressions in knowledge construction and meaning-making. <i>Language, Culture and Curriculum</i> , 28(1), 41-57.	100
8	Leander, K. M., & Rowe, D. W. (2006). Mapping literacy spaces in motion: A rhizomatic analysis of a classroom literacy performance. <i>Reading research quarterly</i> , 41(4), 428-460.	95
9	Hopfenbeck, T. N., Lenkeit, J., El Masri, Y., Cantrell, K., Ryan, J., & Baird, J. A. (2018). Lessons learned from PISA: A systematic review of peer-reviewed articles on the programme for international student assessment. <i>Scandinavian Journal of Educational Research</i> , 62(3), 333-353.	84
10	Burns, A., Freeman, D., & Edwards, E. (2015). Theorizing and studying the language-teaching mind: Mapping research on language teacher cognition. <i>The Modern Language Journal</i> , 99(3), 585-601.	83

Keywords

The figure of frequently used keywords in academic studies on map literacy in the category of education and educational research in the WoS database is given in figure 6.

Figure 6

Frequently Used Keywords in Scientific Studies on Map Literacy (The Frequency Of Use Of Keywords Varies From Blue To Yellow (Wos, June, 2023)).



According to the data obtained from the WoS database, it is seen that the most frequently used keywords in the studies on map literacy in the category of education and educational research are literacy, digital literacy, critical literacy, teacher education and education.

When the minimum number of occurrences of a keyword is selected as 3 in order to increase the readability of the graph and facilitate the analysis while creating the social network of the research areas identified by using the keywords in the publications in the relevant field and the relationships between them, 143 of the 1858 keywords exceed this threshold value. The network connections of 143 keywords with each other are as shown in figure 7.

According to the figure, the publications in the related field are categorized under 11 groups and there are a total of 558 links between these clusters. The most frequently used keywords in these groups are literacy ($f=30$), digital literacy ($f=20$), higher education ($f=16$), concept mapping ($f=14$) and technology ($f=13$). The keywords with the highest linking strength (ls) are digital ($ls=44$), media literacies ($ls=44$), new literacies ($ls=40$), literacy ($ls=38$) and materials ($ls=32$).

been determined that the most common type of publication is in article format. Therefore, this result obtained in this study is similar to the findings of the researchers given in the paragraph above. It is seen that Queensland University of Technology and Florida State University System are the leading institutions where the authors work or are supported. In this category, there are a total of 8 universities from Turkey and a total of 10 publications related to map literacy have been made or supported in these universities.

Within the scope of the research topic, the country where academic studies are published the most is the United States of America. This is followed by Australia, England, Spain, Canada and the United Kingdom, respectively. Türkiye ranks 19th in the category of countries with 9 publications. Similarly, when the studies on digital literacy are examined, it is seen that countries such as the USA, England, Spain, and Australia have a high number of publications (Alagu & Thanuskodi, 2019; Baber et al., 2022; Wang & He, 2022).

Inted Proceedings is at the top of the sources where the studies are included. This is followed by Edulearn Proceedings and English Teaching Practice And Critique, respectively. No citation information for the years 1992 and 1994 was found in the studies conducted in the related field. The number of citations between 1993 and 1995-2003 remained at a very low level. In this period, the number of citations of studies on map literacy is below 10. Since 2004, there has been a general increase in the number of citations of academic studies on map literacy. Since 2004, it is thought that the increase in the number of citations is due to the increase in the number of studies on map literacy issues with the popularity of digital maps and map software and the easier access to studies on map literacy due to the development of communication technologies.

The most cited publication among the studies is the study titled "The Changing Social Spaces of Learning: Mapping New Mobilities" by Leander, K. M., Phillips, N. C., and Taylor, K. H. and published in 2010. Within the scope of the research, the keywords literacy, digital literacy, critical literacy teacher education and education were mostly used.

This study, which is likely to guide research on bibliometric analysis in the field of map literacy in the category of education and educational research, was conducted with a limited data set. The dataset can be expanded in future studies. The limitations of the study include the use of the WoS database to compile the data and the fact that the analysis only includes publications on map literacy in the field of education and educational research. In this study on map literacy in the field of education and educational research, a detailed summary of the international literature was presented by using bibliometric analysis method through WoS. In line with the results of the research, the following recommendations can be made:

- In addition to the Web of Science (WoS) database used in this study, new studies can be conducted using databases such as Scopus, Science Direct, Google Scholar, DergiPark, National Thesis Center.
- It is recommended that the keywords with the highest number of links to map literacy in the research be taken as references for future research.
- In the cross-country co-authorship analysis, it was determined that Turkey does not have any link. It is recommended that the authors who conduct research on the related subject in Turkey should work in a way to increase cooperation between countries.

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Conflict of Interest

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