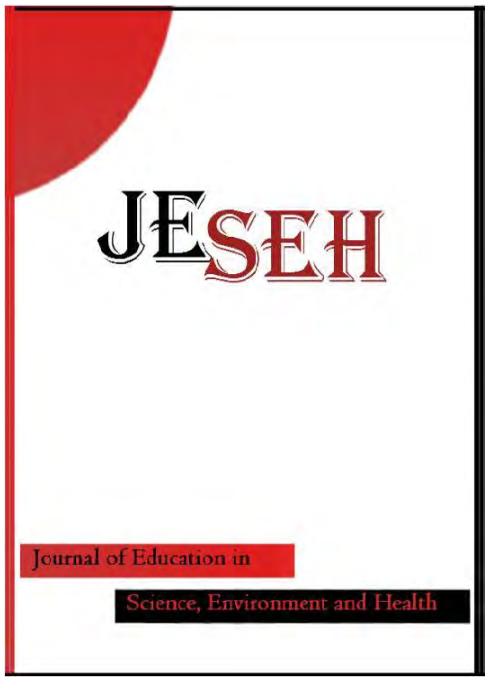

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A Bibliometric Analysis of out of School Learning Environments: Science Mapping

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Abstract

The aim of this study is to understand and analyze the status, development and current trends of out-of-school learning by evaluating scientific studies published in the field of out-of-school learning environments in terms of various parameters. The bibliometric analysis method and Web of Science (WoS) database were used to carry out the research and achieve the determined goals. The research was limited to the years 1982-2021 and 3101 studies were evaluated. In this study scientific studies published on out-of-school learning were examined within the framework of the annual number of publications, keyword analysis, citation analysis, active researchers, journals and countries. In the results of the study, it was determined that the publication trend about out-of-school learning started in 2008 and has continued until today, with the most references occurring in the last 10 years. In addition, it was determined that the most cited author was "Nada Dabbagh", the co-author was "Micheal Eraut", the active journal was "Educational Technology & Society", the most cited and co-cited journal was "Computer & Education" and the active collaborator country was "United States". In this context, it is recommended that researchers increase their studies depending on needs. Furthermore, with the disappearance of the effects of the Covid19 epidemic over time, it is thought that many studies can be conducted in out-of-school learning environments.

Introduction

Today's world undergoes continuous change with the developing technology and due to this change, trained manpower is needed in every field. These well-equipped individuals needed of society can only be raised with a qualified education (Küçükahmet, 1995). The desire to reach quality education makes the change and innovation in the education systems of the countries compulsory (Duman & Aybek, 2003). New approaches have been adopted in the curriculum for change and innovation. One of these approaches is the constructivist learning approach. The constructivist learning approach is based on the construct of knowledge by the learner. In addition, learning is defined as a process in which individuals integrate their knowledge with new ideas and add new meanings to it in the learning environment (Naylor & Keogh, 1999; Poelmans & Wessa, 2015). In the constructivist approach, it is thought that it will not be possible to gain the knowledge, skills and experiences required from the individual in the school environment, which is one of the formal learning environments. Because, within the scope of formal education offered in schools, learning takes place quite far from the real world and without life experiences emphasizing it with symbols and expressions, without allowing interaction with concrete and real objects (Laçin Şimşek, 2011). Learning takes place not only in the school and classroom setting, but also in the social and cultural contexts offered outside of school (Aikenhead, 2005; Osborne et al., 2003). Since a large part of learning takes place outside of formal learning, it is possible to think that school is only a context for learning, so formal and informal learning can take place inside and outside of school and institutional environments (Khaddage et al., 2016). Therefore, it can be concluded individuals can make up with informal learning for their inadequacies in formal learning. Informal learning is valid for situations which appear on their own in life, such as family environment, neighbourhood, etc. (Eshach, 2007). Improving the knowledge and skill level of the individual, being introduced to ideas that are new to them and interacting with new situations (Kara, 2010), being able to implement knowledge in areas outside of school, having the opportunity to integrate their knowledge to daily life, developing feelings of curiosity and exploration in individuals, showing that education and teaching can be sustained in all environments and developing the attitudes of individuals are listed as the aims of informal learning environments (Altıntaş, 2014).

Most of the individuals' own learning takes place through informal learning (Rehm et al., 2018). When the studies in the literature are analyzed, it can be seen that planned visits to different informal environments make

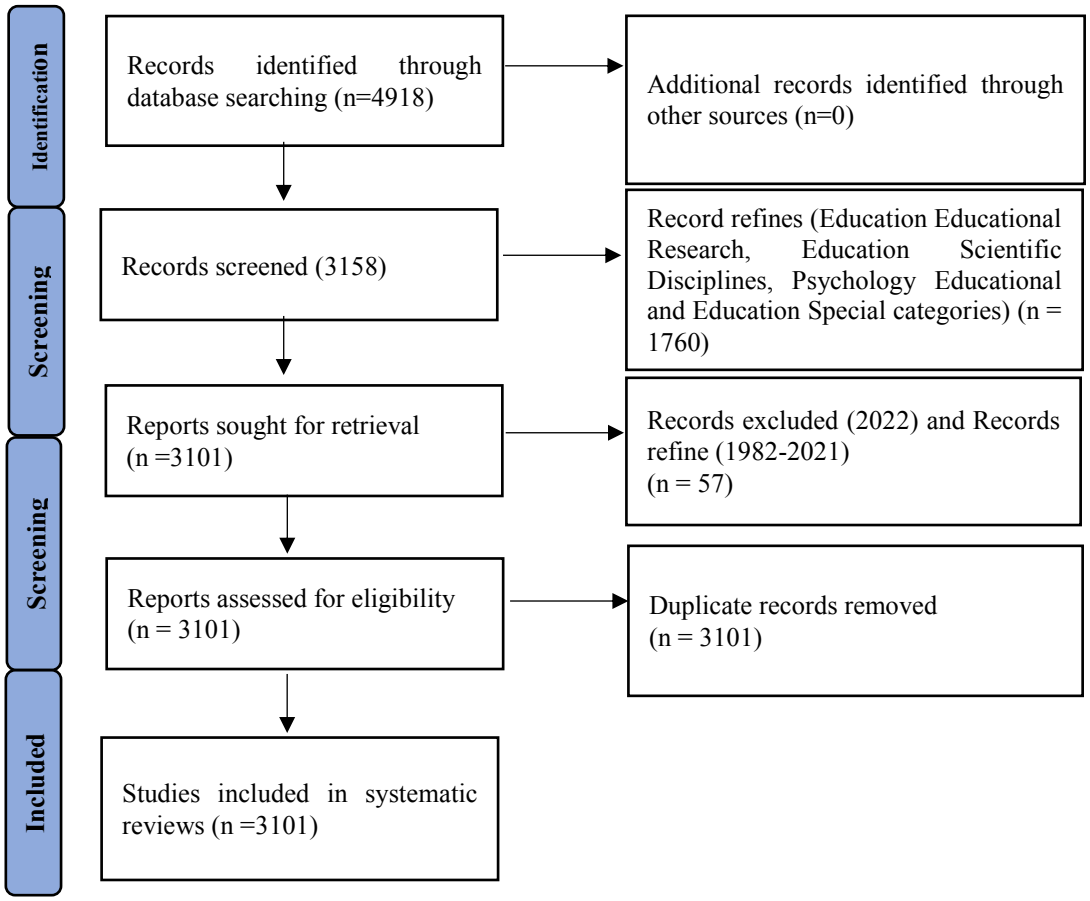
it possible for students to interact with real objects by engaging their interest and curiosity (Falk et al., 1986), contribute to finding the answers to the questions they are curious about (Tatar & Bağrıyanık, 2012), help them acquire concrete experiences (Bamberger & Tal, 2008), reach scientific information (Bamberger & Tal, 2008; Plummer, 2009), associate new learning with pre-learning (Bamberger & Tal, 2007), develop positive ideas on science (Jarvis & Pell, 2005) and positively affect their critical thinking tendencies (Ertaş Kılıç & Şen, 2014). In the literature, the concept of out-of-school education has been emphasized as an informal education resource used in formal education (Salmi,1993). Out-of-school education; covers learning processes that involve educational activities in nature and the living environment (Güngör & Göloğlu Demir, 2022). Therefore, the form of formal education supported by informal education resources is out-of-school education. Out-of-school education is defined as education which takes place in institutions and environments outside of the physical areas of the school building within school hours and scope, by adhering to the goals and gains of lessons in tandem with the education program (Salmi, 1993). The environments where these activities take place are defined as out-of-school learning environments. Mass communication tools, zoos and botanical gardens, family meetings, shopping malls, books, virtual museums, factories, supermarkets, aquariums, planetariums, libraries, homes, science centres, nature centres (Hill et al., 2005; Kelly, 2010; Laçin Şimşek, 2011; Salmi, 1993), industrial resources, resources in areas which are secured by the state (national and local parks, animal shelters, bird and insect areas, etc.), universities, resources based on society (Peters & Stout, 2006) are among out-of-school learning environments. In fact, when the literature is examined, it is seen that there is no clear definition of out-of-school learning (Bozdemir Yüzbaşıoğlu et al., 2021). The reason for this is that such learning can take place in many environments (Hofstein & Rosenfeld, 1996). There are also differences in naming. It is seen that names such as "out-of-school", "free-choice learning", "lifelong science learning", "public understanding of science" is used for this learning in the literature (Dierking et al., 2003). Today, out-of-school learning environments should be dealt with school learning in terms of their doing-experiencing learning aspect (Çığrık, 2016). In this sense, informal education resources should be used together with formal education and it should be made possible for individuals to reach real knowledge by doing research, questioning, exploring and structuring their knowledge in areas which we define as out-of-school learning environments and numerous skills of individuals such as critical thinking, problem solving and life skills should be developed. When the new knowledge, characteristics and skills individuals will acquire are taken into consideration, the importance of out-of-school learning environments become apparent. Out-of-school learning is a useful supplement to traditional lessons at school (Schürmann & Quaiser Pohl, 2022). In terms of this importance, there is an increasing need for studies related to this discipline.

The number and speed of academic studies in the recent years have been increasing and it has become quite difficult to be aware of each published study. Therefore, the need in literature reviews for efficient use of existing studies, advancement of research series and synthesis of past studies to provide some insight to future studies on any discipline has been increasing. One of the methods scientists use to understand and organize findings and present studies is bibliometry (Aria & Cuccurullo, 2017). Bibliometric studies allow scientific studies to be evaluated in terms of quantity and quality (Al & Soydal, 2012). Bibliometric analysis is a systematic method which is used to analyze bibliographic indicators in academic publications (Karagöz & Koç Ardıç, 2019) and it involves the analysis of numerous parameters such as the issuing of documents or publications, their subject, number of authors, publication information, keywords and number of quotes (Al & Coştur, 2007; Ulu & Akdağ, 2015). When the literature is reviewed, it can be seen that bibliometric analyses have been done in numerous areas such as accounting and finance (Aysan & Ünal, 2021; Hotamışlı & Erem, 2014), banking (Alkaç Özdemir & Altıntaş, 2021), management accounting (Çil Koçyiğit & Altsoy, 2021), tourism and entrepreneurship (Gazelci & Gazelci, 2021; Işık et al., 2019; Yılmaz, 2017), gastronomy (Ayaz & Türkmen, 2018), culture and literature (Dönbak, 2020; Karagöz & Şeref, 2019a), technology (Özispa & Akdaş, 2019), chemistry (Birinci, 2008), pharmacology (Bordons & Barrigón, 1992; Thompson, 2018) and health (Agar & Sahin, 2022; Demirci et al., 2022; Demirkol et al,, 2022; Turhan & Ünsal, 2021; Yıldırım Becerikli, 2013). In addition to these areas, it is possible to see that bibliometric analyses have been given place to in the area of education as well in the literature (Arici et al., 2019; Doğru et al., 2019; Gülmez et al., 2021; Karagöz & Koç Ardıç, 2019; Mutlu, 2018; Karagöz & Şeref, 2019b; Swain, 2014; Varışoğlu et al., 2013). Bibliometric analyses have also been given place to in the literature on some out-of-school environments which have great importance in today's education system such as museums (K. Bozdoğan, 2020) and planetariums (A. E. Bozdoğan, 2020). In this study, it is considered that the bibliometric analysis of studies published in certain indexes identified as criteria in the literature on out-of-school learning environments will guide educators and new studies to be carried out in the future. In the study, it is aimed at reaching a specific result by identifying out-of-school learning environments and published scientific studies in terms of various parameters. Therefore, the aim of the study is to understand and analyze the state, development and existing tendencies of out-of-school learning. Within this scope, the answers to the following questions were sought:

1. What is the numerical distribution of scientific studies published on out-of-school learning in terms of years?
2. What is the keyword network of scientific studies published on out-of-school learning?
3. What is the numerical distribution of scientific studies published on out-of-school learning in terms of the number of citations?
4. Who are the authors referred to the most (citation and co-citation) in scientific studies published on out-of-school learning?
5. Which journals have been given place to in scientific studies published on out-of-school learning and what is their number of publications?
6. Which journals have been referred to the most (citation and co-citation) in scientific studies published on out-of-school learning?
7. Which countries have been effective and have cooperated the most in scientific studies published on out-of-school learning?

Method

Bibliometric analysis method was used with the purpose of carrying out the study and reach the determined goals of the study. Bibliometrics is based on mathematical and statistical analysis methods to define certain parameters of scientific publications in certain areas (Pritchard, 1969). Bibliometrics is an important tool to evaluate and analyze academic studies developed in countries, research centres, research groups and journals. Bibliometrics provides objective criteria to the researcher to evaluate scientific quality and productivity. In addition, it contributes to the progress of science in various manners, such as evaluating progress, identifying the most reliable sources of scientific publications, creating an academic foundation to be able to evaluate new developments, identifying main scientific actors and evaluating academic outcomes (Martínez et al., 2015). There are various work-flow steps for the bibliometric method. These steps are successively, collecting data, pre-processing, eliminating, normalizing, mapping, analysis and visualization. At the end of this process, the researcher interprets the results and arrives at conclusions (Cobo et al., 2011).



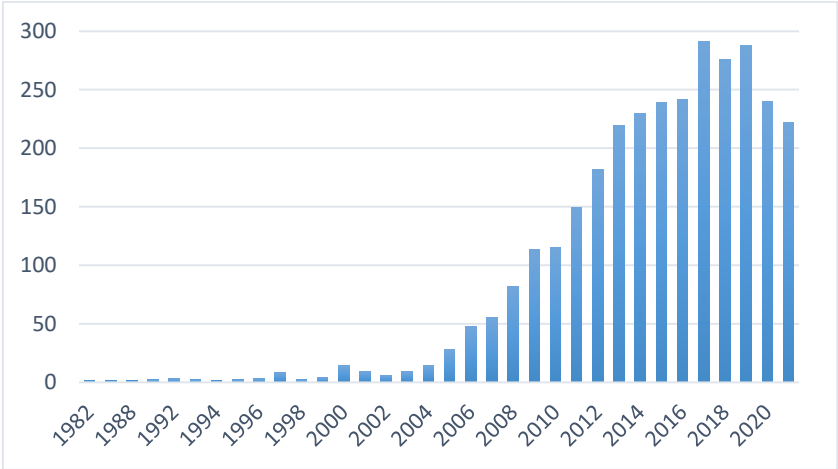
Graphic 1. Flow diagram according to PRISMA statement

Data Analysis

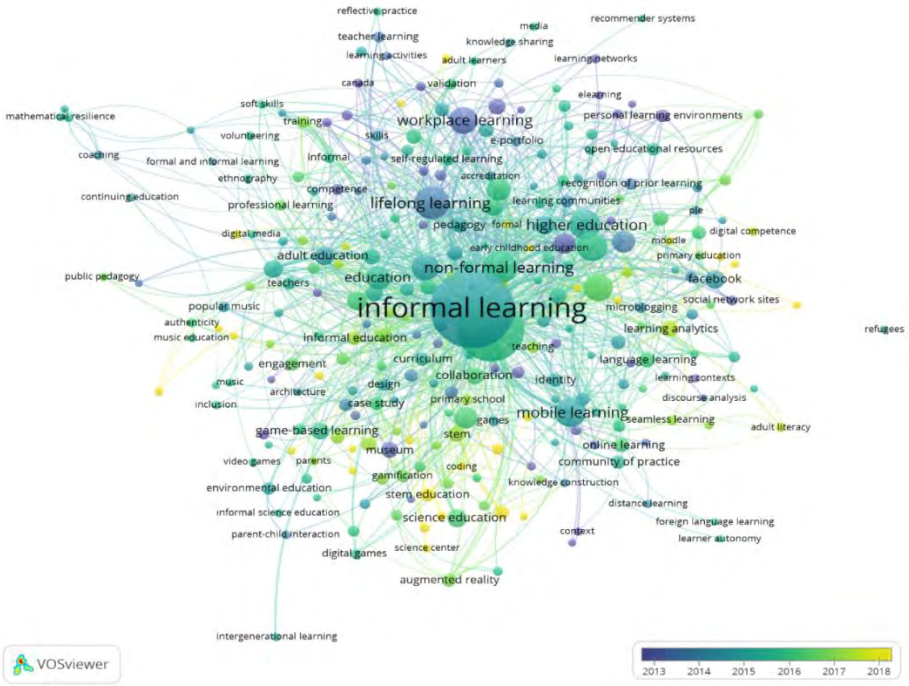
The data obtained in the study were analyzed in line with the bibliometric analysis technique. In the study, the scientific studies in the Web of Science data base were downloaded as full records and in Tab-Delimited (Win) format. The downloaded data were changed into a suitable format and uploaded to the VOSviewer (version 1.6.16) program. The VOSviewer program allows the creation, visualization and interpretation of maps based on bibliometric network data (Van-Eck &Waltman, 2010). The data uploaded through VOSviewer were analyzed in line with the aims of the study and visuals were presented. In addition, descriptive statistics such as percentage and frequency were used in the study as well.

Findings

In this study, the number of annual scientific publications on out-of-school learning, publication type, publication language, vocabulary analysis, citation analysis, active researchers, active journals, active organizations and active countries were analyzed and findings were reached. The numerical distribution of 3101 scientific studies obtained as a result of the scan on out-of-school learning in terms of years was analyzed and presented in Graphic 2.



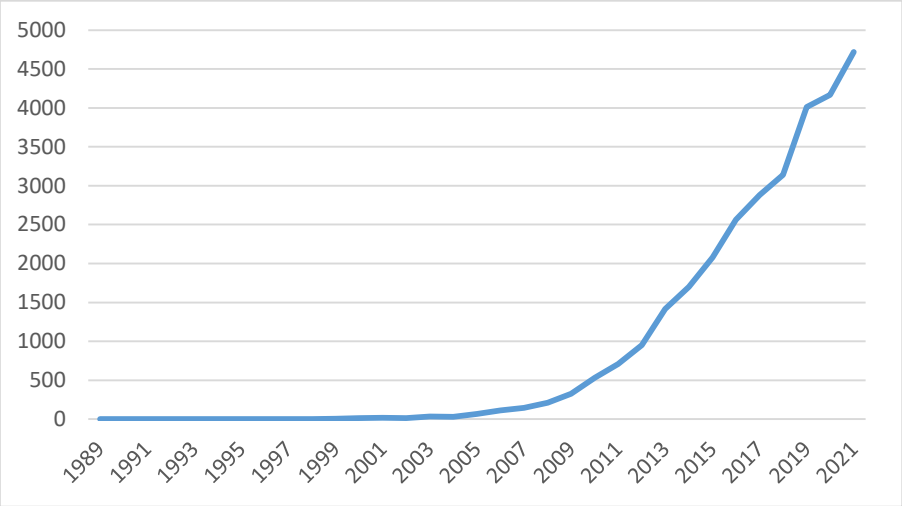
Graphic 2. The distribution of scientific publications on out-of-school learning in terms of years (N=3101)



Graphic 3. Analysis of keywords related to out-of-school learning and current topics

When Graphic 2 is analyzed, it can be seen that the increase trend in the number of studies on this field has started in 2008 and made a leap in 2015. When the data were analyzed, it was determined that the percentage of publications in the last five years was 62,4% and the percentage of publications in the last decade was 88,3%. In addition, it was seen that the highest number of publications on out-of-school learning belonged successively to the years 2017, 2019 and 2018. The decrease in the past year can be explained with the negative effects of the COVID-19 pandemic which broke out in the last months of 2019 and became effective all over the world in 2021. The scientific studies on out-of-school learning were analyzed in terms of keyword network and presented in Graphic 3.

"Co-occurrence" analysis was used to identify scientific studies on out-of-school learning in terms of keyword network and "author keywords" was selected. As a result, 5151 words were reached and this number was reduced to 106 when the frequency number was limited with 10. As a result of the analyses, it was seen that the most used keywords were informal learning (842), lifelong learning (91), non-formal learning (88), formal learning (74), higher education (74), mobile learning (73), social media (65), workplace learning (60), learning (59), education (47), professional development (43), e-learning (41), out-of-school learning (40), collaborative learning (39), web 2.0 (35) and motivation (33). In addition, it was determined with these keywords that there is a tendency towards these subjects. The numerical distribution of the citations made on scientific studies published on out-of-school learning were analyzed in terms years and presented in Graphic 4.

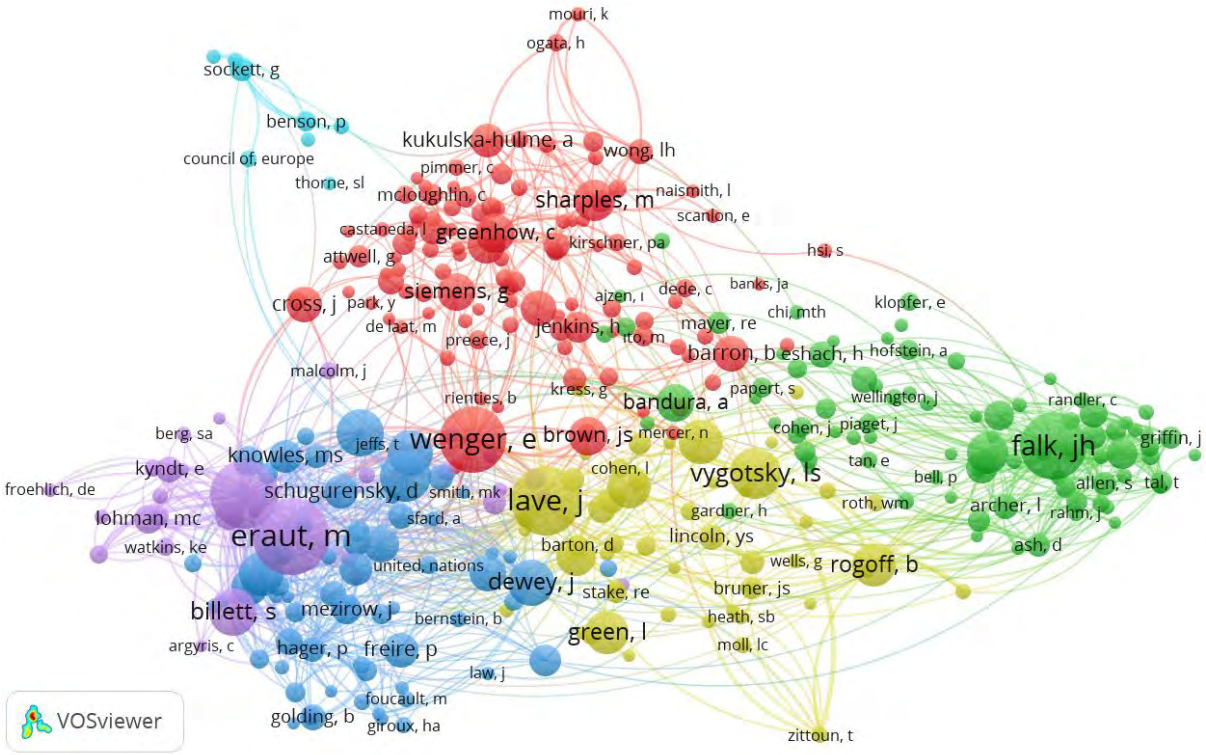


Graphic 4. Numerical distribution of the citations made on scientific studies published on out-of-school learning in terms of years

When Graphic 4 was analyzed, it was seen that the citations made on scientific studies on out-of-school learning began in 1989 and that this increase has reached the highest levels in the last decade. It was determined that a total of 24042 citations were made in terms of years and that the average citation per item was 10,02 and that h-index was 72. In addition, when the citation percentage distribution was analyzed, it was determined that the percentage of citations in the last five years was 63,4% and the percentage of citations in the last decade was 92,54%. The scientific studies published on out-of-school learning were analyzed and the authors who were cited the most and the citation network are presented in Graphic 5.

Graphic 5. Authors who were cited the most (citation analysis)

"Citation" analysis was used to determine the authors who have been cited the most in scientific studies published on out-of-school learning and to view the citation network; "authors" was selected and 5368 authors were reached. With the purpose of determining the authors who have been cited the most among these authors and to view the citation network, at least 3 scientific studies published on this field and 10 citation criteria were selected and the number of authors was reduced to 126 as a result. After the analyses, the authors who have been cited the most were determined as Nada Dabbagh (730 citations), Chee-Kit Looi (586 citations) and Lung-Hasiang Wung (521 citations). Scientific studies published on out-of-school learning were analyzed and the authors who have been cited the most (co-citations) and the citation network is presented in Graphic 6.



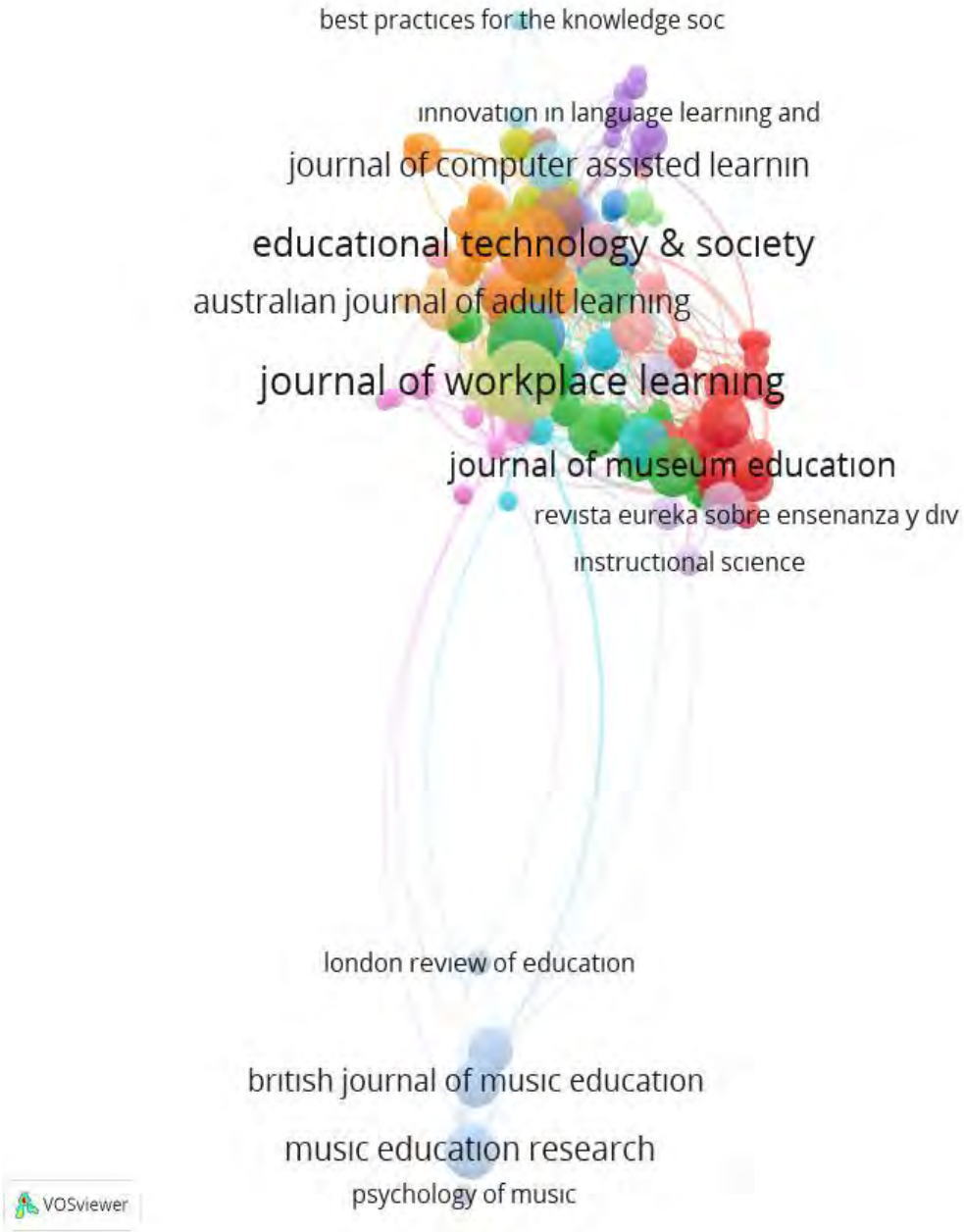
Graphic 6. Most cited authors (co-citation analysis)

"Co-citation" analysis was used to determine the authors who have been co-cited the most in scientific studies published on out-of-school learning and "cited-authors" was selected and 43182 authors were reached. In order to determine the authors who have been cited the most among these authors and to view the citation network, at least 20 citation criteria identified automatically were selected and the number of authors was reduced to 351 as a result. After the analyses, it was determined that the authors who have been cited the most (co-citation) on out-of-school learning were Micheal Eraut (339 citations), Jean Lave (291), Victoria J. Marsick (286 citations) and Etienne Wenger (270 citations). Journals active within the scope of scientific studies on out-of-school learning were analyzed. As a result, 855 sources on out-of-school learning were reached and the first 10 journals which published the highest number of studies on the field are presented in Table 1.

Table 1. Journals active within the scope of scientific studies on out-of-school learning (N=3101)

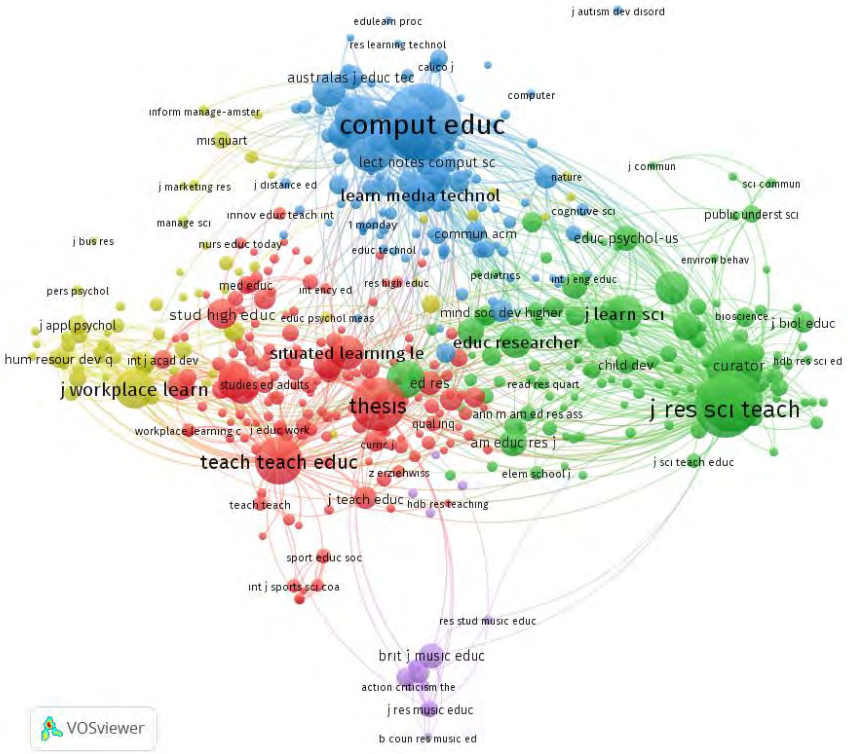
Journal		Frequency (n)
1.	Journal of Workplace Learning	43
2.	Educational Technology & Society	36
3.	International Journal of Lifelong Learning	34
4.	Interactive Learning Environments	26
5.	Adult Education Quarterly	26
6.	British Journal of Educational Technology	23
7.	Journal of Museum Education	22
8.	Music Education Research	20
9.	Computers & Education	20
10.	Learning Media and Technology	19

Table 1 shows the journals which are active on out-of-school learning and contribute the most to the field. The leading journal among these was Journal of Workplace Learning (43 scientific studies). This journal was followed successively by Educational Technology & Society (36), International Journal of Lifelong Learning (34 scientific studies) Interactive Learning Environments (26 scientific studies) and Adult Education Quarterly (26 scientific studies). The scientific studies published on out-of-school learning were analyzed and the most cited journals and the citation network are presented in Graphic 7.



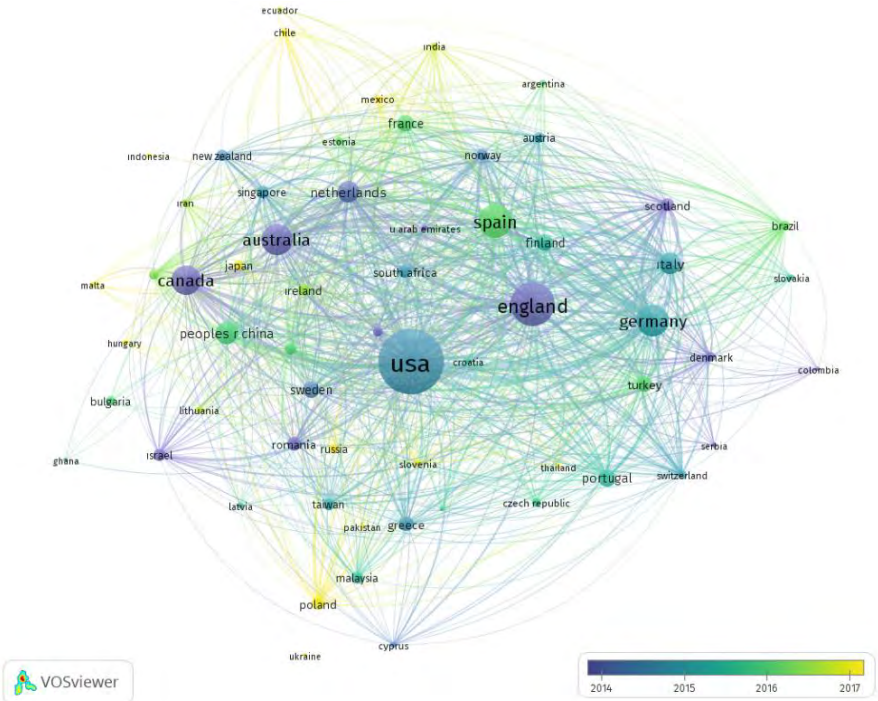
Graphic 7. Most cited journals (citation analysis)

"Citation" analysis was used to determine the most cited journals in scientific studies published on out-of-school learning and to view the citation network; "source" was selected and 902 sources were reached. In order to determine the most cited source among these sources and to view the citation network, at least 3 scientific studies published on this field and 10 citation criteria were selected and the number of journals was reduced to 176 as a result. After the analyses, it was determined that the most cited journals were Learning Media and Technology (1404 citations), Computer & Education (1150 citations), and Educational Technology & Society (1024 citations). The scientific studies published on out-of-school learning and the most cited journals and the citations network is presented in Graphic 8.



Graphic 8. Most cited journals (co-citation analysis)

"Co-citation" analysis was used to determine the most co-cited journals in scientific studies published on out-of-school learning and to view the citation network; "cited-source" was selected and 35381 sources were reached. In order to determine the most cited source among these sources and to view the citation network, at least 20 citation criteria identified automatically were selected and the number was reduced to 498 as a result. After the analyses, it was determined that the most cited journals were Computer & Education (1050 citations), Science Education (711 citations), Journal of Research in Science Teaching (731 citations) and International Journal of Science Education (600 citations). The scientific studies published on out-of-school learning were analyzed and the active countries which cooperated the most and the publication network are presented in Graphic 9.



Graphic 9. Active countries which cooperated the most in terms of out-of-school learning

"Bibliographic coupling" analysis was used to identify active countries which cooperated the most on scientific studies related to out-of-school learning and to view the publication network; "country" was selected and 99 countries were reached. In order to determine the most active and cooperative countries among these sources and to view the publication network, at least 5 publication criteria identified automatically were selected and the number was reduced to 61 as a result. After the analyses, it was determined that the first 10 countries which were active and cooperated the most were the USA (583 publications, 8589 citations), England (293 publications, 5892 citations), Germany (164 publications, 1378 citations), Spain (181 publications, 722 citations), Italy (84 publications, 298 citations), Australia (158 publications, 1577 citations), Netherlands (83 publications, 1299 citations), Canada (146 publications, 1179 citations), Finland (52 publications, 1121 citations), Scotland (34 publications, 374 citations) and Turkey (46 publications, 164 citations).

Conclusion, Discussion and Suggestions

In this study, it was aimed at presenting a holistic evaluation on the general state of international literature related to out-of-school learning environments. There has been a need to carry out a bibliometric study in line with this aim, because bibliometric studies are regarded as extremely important in terms of obtaining the "big picture" related to their subject fields (Karagöz & Şeref, 2019a). Bibliometric studies present the opportunity to get to know journals or branches of science in a better manner and obtain information about the subject field, find out what the efficiencies and inadequacies of scientific publications are, identify the positive, strong, inadequate and weak sides of scientific publications and evaluate the performances of publications (Hotamışlı & Efe, 2015). In this study, it was aimed at presenting the big picture by determining the general framework of out-of-school learning environments. The scientific studies related to out-of-school learning were analyzed within the framework of number of annual publications, keyword analysis, citation analyses, active researchers, active journals and active countries in the study.

When the studies on the related field were analyzed, it was concluded that the increase trend in the number of studies started in 2008, made a leap in 2015 and the highest number of studies were carried out in 2017. In Saraç's study (2017), it was determined that researches related to out-of-school learning environments started increasing in number in 2010. The decrease in 2020 can be explained with the negative effects of the COVID-19 pandemic which broke out in the last months of 2019 and continue to be effective all over the world. It is considered that as the effects of the COVID-19 pandemic gradually subside, numerous studies will be carried out on out-of-school learning environments.

It was concluded that the keywords used most in scientific studies within the scope of out-of-school learning are informal learning, lifelong learning, non-formal learning, formal learning, higher education, mobile learning etc. In addition, the analysis of obtained studies led to the idea that there is a tendency towards specific out-of-school learning environments rather than viewing these environments in a general framework and that there is an accurate tendency towards the related subjects with these words.

It was concluded that citations of scientific studies related to out-of-school learning began in 1989; this increase has reached the top level in the last decade and that when the citation percentage distribution was analyzed, it was determined that the citation percentage of the last five years was lower than the citation percentage of the last decade. Although the rate of increase decreased in 2019 and 2020, when COVID-19 started, this situation returned to its previous position in 2021.

When the authors who is the most cited analyzed, it was found that them are Nada Dabbagh, Chee-Kit Looi and Lung-HasiangWung. When analyses were done to determine the authors who were co-cited the most in scientific studies published on out-of-school learning, it was seen that Micheal Eraut, Jean Lave, Victoria J. Marsick and Etienne Wenger have been co-cited the most in relation to out-of-school learning. It can be suggested to researchers who will be doing research on out-of-school learning to review the studies of active authors mentioned above to develop their point of view, acquire sufficient knowledge on the field and direct their studies.

The journals active within the scope of scientific studies on out-of-school learning were analyzed and 855 sources related to out-of-school learning were reached. In the light of the obtained findings, it was determined that the active journals which contributed the most to the area of out-of-school learning were successively "Journal of Workplace Learning", "Educational Technology & Society", "International Journal of Lifelong Learning" and "Interactive Learning Environments". As a result of the analyses to determine the most cited journals in scientific studies published on out-of-school learning, it was concluded that the most cited journals

successively were “Learning Media and Technology”, “Computer & Education” and “Educational Technology & Society”. 35381 sources were reached to determine the most co-cited journals in scientific studies published on out-of-school learning. As a result of the analyses done to determine the most-cited source among these sources, it was concluded that the most cited journals successively were “Computer & Education”, “Science Education”, “Journal of Research in Science Teaching” and “International Journal of Science Education”. It can be suggested to researchers who will be doing researches on out-of-school learning to access these journals to acquire knowledge on the field and evaluate the findings of their own researches in comparison to the other studies in the literature. It is considered that this will allow the researchers to save time and access numerous authentic studies on this field.

As a result of the analyses done to determine active countries which cooperated the most in scientific studies on out-of-school learning, it was concluded that the first 10 active countries which cooperated the most were the USA, England, Germany, Spain, Italy, Australia, Netherlands, Canada, Finland and Scotland. In the light of this finding, it is considered that countries who have contributed less to this field will contribute greatly to the literature and research groups by increasing the number of studies and strengthening cooperation with other institutions.

This study is limited with 3101 studies obtained from the Web of Science data base, carried out between the years 1982-2021. In this light, the exclusion of studies outside the Web of Science data base from this study is considered as the main limitation of the study. In this context, researchers are suggested to analyze studies or postgraduate theses obtained from different data bases in future bibliometric studies to be carried out in this field. It is considered that the results of the study will present researchers with ideas in terms of acquiring information on studies about out-of-school learning, identifying inadequacies and needs and putting forward important issues to be analyzed.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in JESEH journal belongs to the authors.

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