The Use of Literary Elements in Teaching Mathematics: 
A Bibliometric Analysis from 1951 to 2021

The aim of this study is to examine the studies in which mathematics teaching and literary elements are discussed together. For this purpose, a literature search was made to cover the years 1951-2021 using keywords such as "children's literature", "story" and "mathematics", which are thought to be related to the subject. The studies obtained as a result of the review of the journals examined in the Scopus index using the PRISMA diagram were also investigated in terms of title, keywords and abstracts before being included in the bibliometric analysis. As a result, 484 articles that met the inclusion criteria of the research were subjected to bibliometric analysis and descriptive analysis. The most influential authors, articles, journals, institutions, the trend of the publications by years, cooperation between institutions and cooperation between authors were determined. Thus, the conceptual, intellectual, and social structure of the subject has been revealed.

Keywords: bibliometric, literary elements, mathematics education

Introduction

One of the ways to differentiate and enrich mathematics teaching according to the individual characteristics of students is to benefit from literary elements such as children's picture books and stories in teaching. There are studies showing that this approach, which integrates the fields of mathematics and literature, contributes to both students and teachers in various ways (Edelman et al., 2019; Forbringer et al., 2016). According to studies, the use of literary elements in mathematics teaching supports the presentation of mathematical concepts in a context, making mathematical associations, mathematical language, and cognitive and affective processes related to mathematics (Columba et al., 2005; Green, 2013; Hassinger-Daas et al., 2015; Lemonidis & Kaifa, 2019; Mink & Fraser, 2005). However, there are also studies that draw attention to the need to be cautious in some respects against such an approach (Forbringer et al., 2016; Nurnberger-Haag, 2017; Nurnberger-Haag et al., 2020). Because literary products such as children's picture books to be used for mathematics teaching may not always meet the desired criteria for mathematics teaching due to the fact that they contain misconceptions and do not take into account the developmental processes that must be followed for teaching a mathematical concept such as numbers (Nurnberger-Haag, 2017; Powell & Nurnberger-Haag, 2015; Ward et al., 2017; Yılmaz Genç et al., 2017).

In this approach, where the two fields are integrated, the characteristics of the practitioners who will make the integration play an important role as well as the selection of literary products/elements to be utilized. For this reason, it is seen that researchers conduct studies on this subject such as pre-service and
in-service teachers’ competencies, beliefs, and classroom practices of them (Author/s, 2020; Author/s, in press; Cooper et al., 2020; Farrugia & Trakulpdetkrai, 2020; Prendergast et al., 2019; Rogers et al., 2015). According to these studies, although pre-service and in-service teachers have similar beliefs and apply similar practices, they also have some incomplete understandings such an approach is not appropriate for individuals from all age groups and for teaching every mathematics subject (Larkin & Trakulphadetkrai, 2019; Trakulphadetkrai, 2018). Because of such beliefs, practitioners may be more cautious about the use of literary elements in mathematics teaching. The fact that the studies carried out mostly in the context of early childhood students and mathematics subjects may have been effective in the emergence of these beliefs (Edelman et al., 2019). Whatever the reason, it is thought that it is necessary to examine the studies on the subject from a wider perspective, since the practitioners are avoid from this approach, which has the potential to enrich and differentiate mathematics lessons, may be an obstacle to students’ benefits from this approach. Because teachers’ classroom practices are affected by their beliefs (Staub & Stern, 2002). Based on these reasons, in this study, it is aimed to reveal the intellectual, social, and conceptual structure of the studies on the use of literary elements in mathematics teaching. Thus, by presenting a general framework in terms of studies on the subject, it will contribute to taking steps towards both future research and teachers’ classroom practices.

Literature Review

Wu (2018) examined the research on children's picture books without any distinction. He analyzed a total of 286 articles published between 1993 and 2015, which he obtained as a result of his search in WOS, with HistCite software. Wu (2018) used only "picture book" and "picturebook" as keywords in his study focused on bibliometric analysis and presented a more general perspective on the studies on children's picture books.

It has been determined that bibliometric studies conducted specifically on mathematics education are carried out on a general topic such as mathematics education or specific issues such as number sense and mathematics anxiety, and no studies related to the research topic have been encountered (Ersözlu & Karakuş, 2019; Gökçe & Güner, 2021; Güner & Gökçe, 2021; Jiménez-Fanjul et al., 2013; Özkaya, 2018; Ramirez & Rodriguez Devesa, 2019). However, it has been observed that some studies, which are used meta-analysis or descriptive analysis, are focused on research related to the subject or children's picture books (Edelman et al., 2019; İnal-Kızıltepe, 2018; Powell & Nurnberger-Haag, 2015; Yılmaz Genç et al., 2017). For example, Edelman et al. (2019) conducted a meta-analysis study in which they examined studies on the use of children's literary products in mathematics teaching, covering the years of 1991-2016. Accordingly, they found that a very small proportion of the articles on this approach were experimental studies. When they analyzed
the few (n=23) experimental studies they obtained, they figured out that the
studies were carried out under the titles of student success, motivation and
participation, mathematical discourse, and pre-service/in-service teacher
education. Finally, Arizpe (2021) conducted a study in which she evaluated the
studies on children's picture books between 2010-2020.

As can be seen, the studies on the subject were carried out in a way to
cover certain years and keywords, while other studies were carried out in the
context of meta-analysis and descriptive analysis. For this reason, it is thought
that a more holistic perspective on the use of literary elements in mathematics
education will be gained with the bibliometric analysis to be made within the
scope of this study. Because bibliometric analysis is carried out by selecting
the publications and selected keywords by the authors on this subject (Pring,
2015). Based on this, the research questions were determined as follows:

1. How do the articles on the use of literary elements in mathematics
teaching change according to the years they were published?
2. Which authors, articles, journals, institutions, and countries are the
most influential in the studies on the use of literary elements in
mathematics teaching?
3. Regarding the use of literary elements in mathematics teaching, what
kind of intellectual, social, and conceptual structure emerges in terms
of cooperation between countries, cooperation between authors and co-
word network?

**Methodology**

Bibliometric analysis was used in this study in order to examine the
research carried out on the use of literary elements in mathematics teaching.
Because it is possible to carry out quite comprehensive and more transparent
studies with systematic review studies such as bibliometric analysis (Andrews,
2005). In addition, through the maps obtained because of the analysis, the links
of any publication, author or the cited author with other publications and
authors related to the subject of interest can be revealed (Zupic & Ćater, 2015).

**Data Collection**

The data of this study were obtained through Scopus, among the
international citation indexes, Web of Science, Scopus, Google Scholar,
Microsoft Academic and Dimensions (Moral-Muñoz et al., 2020). For this,
first of all, in the Web of Science and Scopus indexes, which are two indexes
where qualified international publications are indexed, initial search was made
with the search code written based on the keywords used in the research on
this subject. As more documents were reached in Scopus as a result of the
search, the study was carried out on the articles in the Scopus index (Mongeon
& Paul-Hus, 2016). Because in the first search using the same keywords, it
was seen that there were more publications in Scopus than in WOS. Since
Scopus is more comprehensive in terms of the relevant subject, the study was
continued with it. A search was made for all times covering the date of
21.09.2021. Social Studies and Psychology filters were used because the
studies that fit the scope of the study were not directly related to the field of
educational sciences in the Scopus database and some studies on this subject
were related to the field of psychology. The range of studies using literary
products such as children's picture books to many fields such as education,
culture, psychology, and literature was effective in taking this decision
(Arizpe, 2021). The code used in the scanning process is as follows:

TITLE-ABS-KEY ((math* OR geom* OR counting*) AND ("children's
literature" OR "children's book" OR "picture book" OR "picturebook" OR
"tradebooks" OR "trade book" OR "story book" OR "storybook" OR "stories"
OR "storybase" OR "storyline" OR "storytell*" OR "shared book" OR "read-
aloud" OR reading))

After this search code was applied, a total of 25,179 studies were reached.
When the obtained studies were adjusted to be only articles according to the
document type, they returned 17,213; 15776 when only in English publications
are selected; when journal is selected as the source type, 15,406 articles
remain. Finally, when Social Studies and Psychology filters were activated,
6885 articles remained. These articles were also re-examined in terms of the
title of the publication and the abstracts in order to provide a more accurate
result on the subject, so the data were extracted by excluding the articles that
are not related to the subject. This was done in order to prevent the inclusion
of irrelevant studies as a limitation of the bibliometric analysis (Zupic & Cater,
2015). The title and abstract were examined while performing the necessary
data cleaning for studies that did not match the scope of the research (Le Thi
Thu et al., 2021). Studies in which the keywords used during the data cleaning
were used out of the scope of this research (for example, the use of the word
story while explaining the research methodology) were not included in the
analysis. As a result, a total of 484 articles were included in the bibliometric
and descriptive analysis. The approach used in the data collection phase is
explained in the context of the Preferred Reporting Items for Systematic
Review and Meta-Analysis (PRISMA) (Pham et al., 2021) diagram (Fig. 1).
The data obtained within the scope of the research were analyzed using bibliometric analysis and descriptive statistics. In this context, the distribution of studies on the use of literary elements in mathematics education by years, the 10 most cited articles, the authors who contributed to the field and the number of publications, the active journals in this subject, countries and institutions were analyzed using bibliometric analysis techniques. In addition, collaborative network analysis was used to determine keyword analysis, source co-citation network analysis and author co-citation network analysis. VOSviewer (Version 1.6.9) (Van Eck & Waltman, 2010) package program was preferred as an analytical tool in collaborative network studies.

Results

First of all, the distribution of 484 articles reached as a result of the review according to years was examined and presented in Figure 2. Accordingly, it is seen that the articles about literary elements in mathematics teaching were first published in 1951. It is seen that the number of studies on this subject has increased. But this increase does not show a regular trend. The highest number of publications (n=64) on the subject were made in 2020, and these publications constitute 13.22% of all publications on the subject.
Figure 2. Number of publications about literature elements in mathematics education between 1951 and 2021 (September)

The list of the top 10 authors who have the most publications on the use of literary elements in mathematics teaching is presented in Figure 3. The three most prolific authors are Weber, K. (14%, n=6), Yang, K. L. (14%, n=6) and Powell, S. R. (12%, n=5), respectively.

Figure 3. Top authors of literature elements in mathematics education

It has been seen that there are a total of 229 journals that include studies on literary elements in mathematics education. Among these journals, the journals that include the most research on the subject are given in Table 2. Accordingly, it was determined that the most publications on the subject were published in Primus (n=17) journal. This journal is followed by the
and Reading Teacher with 14 articles each. However, these journals are not the journals with the highest impact factor among the top 10 journals.

Table 2. Top Journals for literature elements in mathematics education

<table>
<thead>
<tr>
<th>Journal</th>
<th>Number Of Publications</th>
<th>Citescore (Impact Factor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primus</td>
<td>17</td>
<td>0.7</td>
</tr>
<tr>
<td>International Journal Of Mathematical Education In Science And Technology</td>
<td>14</td>
<td>1.9</td>
</tr>
<tr>
<td>Reading Teacher</td>
<td>14</td>
<td>1.6</td>
</tr>
<tr>
<td>Early Childhood Research Quarterly</td>
<td>12</td>
<td>4.4</td>
</tr>
<tr>
<td>Educational Studies In Mathematics</td>
<td>12</td>
<td>3.4</td>
</tr>
<tr>
<td>Journal Of Educational Psychology</td>
<td>11</td>
<td>9.5</td>
</tr>
<tr>
<td>Early Education And Development</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>International Journal Of Science And Mathematics Education</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>ZDM - International Journal On Mathematics Education</td>
<td>10</td>
<td>3.6</td>
</tr>
<tr>
<td>Journal Of Adolescent And Adult Literacy</td>
<td>9</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Co-citation analysis (with at least 20 citations) of journals that include studies on literary elements in mathematics education was also conducted in the study (Figure 4). Accordingly, it was seen that the journals on this subject were collected in 4 different clusters. It was determined that the main clusters, the red cluster, mostly focused on mathematics education and reading, while the green cluster focused more on developmental psychology and special education.

Figure 4. Co-citation analysis on journals
The distribution of studies on the use of literary elements in mathematics education by institutions and countries is presented in Table 3. It is seen that there are 6 universities that share the first place among 160 institutions in terms of the articles they produce. Universities that share the first place with 8 articles each produced are Vanderbilt University, Purdue University, The University of Texas at Austin, Texas A&M University, Michigan State University and University of Wisconsin-Madison. In terms of a total of 49 countries, the countries that have the most publications are USA (n=267), United Kingdom (n=28) and Turkey (n=22), respectively. Considering the top ten universities in terms of the number of publications, it is not surprising that the USA ranks first in terms of publications on this subject.

Table 3. Top Affiliates and Countries

<table>
<thead>
<tr>
<th>Rank</th>
<th>Affiliates</th>
<th>Record Articles</th>
<th>Rank</th>
<th>Countries/regions</th>
<th>Record Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vanderbilt University</td>
<td>8</td>
<td>1</td>
<td>USA</td>
<td>267</td>
</tr>
<tr>
<td>1</td>
<td>Purdue University</td>
<td>8</td>
<td>2</td>
<td>United Kingdom</td>
<td>28</td>
</tr>
<tr>
<td>1</td>
<td>The University of Texas at Austin</td>
<td>8</td>
<td>3</td>
<td>Turkey</td>
<td>22</td>
</tr>
<tr>
<td>1</td>
<td>Texas A&amp;M University</td>
<td>8</td>
<td>4</td>
<td>Canada</td>
<td>19</td>
</tr>
<tr>
<td>1</td>
<td>Michigan State University</td>
<td>8</td>
<td>5</td>
<td>Australia</td>
<td>18</td>
</tr>
<tr>
<td>1</td>
<td>University of Wisconsin-Madison</td>
<td>8</td>
<td>6</td>
<td>Indonesia</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>National Taiwan Normal University</td>
<td>7</td>
<td>7</td>
<td>Netherlands</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>University of Michigan Ann Arbor</td>
<td>7</td>
<td>8</td>
<td>Germany</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Rutgers University News Brunswick</td>
<td>7</td>
<td>8</td>
<td>Taiwan</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Florida State University</td>
<td>6</td>
<td>9</td>
<td>Israel, Sweden</td>
<td>8</td>
</tr>
</tbody>
</table>

In the study, the institutions that provided the funds for the research on the use of literary elements in mathematics education were also examined. It has been determined that a total of 117 funds have been supported for research carried out in this context. Among these funding agencies, those who shared the top three places that offered the most funding were National Science Foundation (n=41), U.S. Department of Health and Human Services (n=9), Eunice Kennedy Shriver National Institute of Child Health and Human Development (n=8), National Institutes of Health (n=8) respectively.
Figure 5. Funding Agencies

The list of the most cited publications among the studies on this subject is presented in Table 3. Accordingly, the most cited publication is published in the Harvard Educational Review with the title “Teaching disciplinary literacy to adolescents: Rethinking content-area literacy”. This article was published by Shanahan T., & Shanahan, C. in 2008 and received 632 citations. When the most cited articles are examined, we are faced with a wide spectrum of research on the use of literary elements in mathematics teaching, such as problem solving, disciplinary literacy, integrated education programs (STEAM etc.) and early childhood.

Table 3. Top articles that received the most citations

<table>
<thead>
<tr>
<th>Article</th>
<th>Author(s)</th>
<th>Published</th>
<th>Journal</th>
<th>Times Cited</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Teaching disciplinary literacy to adolescents: Rethinking content-area literacy</td>
<td>Shanahan, T., &amp; Shanahan, C.</td>
<td>2008</td>
<td>Harvard Educational Review</td>
<td>632</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>7.</td>
<td>What is disciplinary literacy and why does it matter?</td>
<td>Shanahan, T., &amp; Shanahan, C.</td>
<td>2012</td>
<td>Topics in Language Disorders</td>
</tr>
</tbody>
</table>

In the visual, which examines the cooperation network between countries and authors in the context of the publications produced (Fig. 6), 48 countries and a total of 40 links established between these countries are included. The countries with the highest number of connections among countries are USA (13 links), UK (9 links) and Netherlands (6 links), respectively. This shows that the number of USA and UK related studies are high. Therefore, these countries have stronger cooperative social networks.
In Figure 7, the results of co-authorship analysis are given. A total of 10 links and 3 clusters were identified in the analysis. Authors usually appear to have 2 or 3 connections. Therefore, authors who carry out studies on the use of literary elements in mathematics teaching mostly work alone.

The authors’ co-citation network analysis is presented in Figure 8. When the cut-off point for at least 40 citations was determined among the authors working on this subject, the number of authors decreased to 37. When the co-citation network of 37 authors was examined, 4 clusters emerged. The first cluster, the red one, includes names such as Van den Heuvel Panhuizen, M., Elia, I., Ginsburg, H. P. and Casey, B. The studies in this cluster are about the use of children's literary products in mathematics teaching, children's picture books and early childhood mathematics education. Therefore, it is possible to say that the works of the authors in this cluster are mostly cited from the focus.
of children’s picture books. It is seen that names such as Alibali, M. W. and Carpenter, T. P. in the second cluster (green) work on story problems. It is seen that the third cluster (blue) is further away from the other three clusters and includes names such as Vygotsky, L. S. Since the use of literary elements in mathematics teaching brings in-class discussions and sharing, some studies on the subject can refer to Vygotsky’s social constructivism theory (Nurnberger et al., 2020). In the fourth and last cluster (yellow), names such as Geary, D. C., Fuchs, D., and Fuchs, L. S. stand out. Such a cluster may have emerged because these researchers work on learning disabilities focused on both language skills and mathematics in the intervention programs they developed and applied to children’s books to support both areas. When the co-citation network on the use of literary elements in mathematics teaching is evaluated in general, this subject finds its answer in different subjects such as problem solving, children’s books and intervention programs, and it is also cited from fields such as psychology, which is related to educational sciences, together with different fields of educational sciences.

Figure 8. Co-citation authors network

In studies on the use of literary elements in mathematics teaching, co-word analysis was performed to reveal the frequency of keywords used by the authors and the relationship between them (Figure 9). As a result of the co-word analysis, it is seen that a total of 13 but 2 main clusters emerged. These clusters are shaped around words close to the keywords "content (area) literacy and disciplinary literacy" and "elementary mathematics education (pre-school and primary school)". When the changes in the keywords used by the authors in their studies are analyzed on a yearly basis, the following picture emerges:
in 2010-2012, textbooks, pedagogy, writing and constructivism; in 2012-2014, mathematics, storytelling, word problems and elementary education; in 2016-2018 early childhood, picture books, comprehension, digital storytelling, disciplinary literacy and reading strategy, and finally in 2018-2020, shared reading, parent-child interactions, preservice teachers, children's books, content literacy, and professional development keywords are used.

Figure 9. The co-word analysis

According to the analysis, the prominent words are mathematics (n=51), early childhood education (n=32), mathematics education (n=22), (reading) comprehension (n=18), early childhood (n=17), problem solving (n=17), content (area) literacy (n=16), children's literature (n=15), instructional tools (strategy, method, technique, and material) and digital storytelling (n=13). When the connections between the keywords are examined, it is seen that the mathematics education and mathematics keywords have a connection with children's literature; there is a connection between content (area) literacy and children's literature, but there is no connection between content (area) literacy, mathematics education and mathematics. This situation can be considered as an indication that the limitations of the keywords chosen by the authors are left aside, that the studies linking these three areas are limited. Therefore, this table, which emerged as a result of the common word analysis, offers some perspectives on the conceptual structure of the use of literary elements in mathematics education (Öztürk & Gökhan, 2021).
Discussion

In this study, in which bibliometric and descriptive analyzes of the articles on the use of literary elements (children's picture books, stories and reading) in mathematics education were investigated, a search was carried out on the Scopus database covering the years 1951-21 September 2021. A total of 484 studies were accessed according to the inclusion criteria. The data were first analyzed with descriptive analysis. Accordingly, it was seen that the first study on the subject was carried out in 1951 and the studies showed an irregular increasing trend. The most studies on the use of literary elements in mathematics education were carried out in 2020. Although not regularly, it can be said that the number of studies generally tends to increase after 2010. In this case, the importance of various literacy such as mathematical literacy due to exams such as Programme for International Student Assessment (PISA) may have played a key role. This finding of the study coincides with the results of Wu (2018). He also found that the change of studies on children's picture books according to years tends to increase, albeit irregularly.

Three of the researchers who have the most publications on the use of literary elements in mathematics education are Weber, K., Yang, K. L., and Powell, S. R. Weber, K. conducts studies on the reading of mathematical texts and proof as a dimension of mathematical reading. Yang K. L. has a similar ground that conducted studies on reading mathematical content and focused on reading comprehension. Powell, S. R., on the other hand, conducted studies on mathematical vocabulary, learning disabilities, and children's picture books. Powell, S. R. is followed by Cooper, S., Elia, I., Herbst, P., Purpura, D. J., and Van den Heuvel-Panhuizen, M. It is seen that the related authors also carry out studies on children's picture books, problem solving, mathematical language and animated stories. Accordingly, the studies of the authors who published the most in terms of selected keywords were carried out in a way to include different dimensions of mathematical reading and literary elements. This associates with the contribution of the context that stories and various mathematical texts provide for learning mathematics (Golden, 2012; Trakulphadetkrai et al., 2019). When the journals that include studies on this subject are examined, it is seen that the authors mostly publish in journals that focus on topics such as mathematics education, early childhood education, reading, literacy and educational psychology. This may be related to the multidimensional nature of the subject and the importance given to reading for learning.

Considering the distribution of studies on the use of literary elements in mathematics education according to institutions and countries, it is seen that there are six institutions that share the first place with eight publications. As in the distribution of the top ten universities, the most publications on the subject originated in the USA. This may have arisen because only in English publications were included in this study. A similar view emerges when the funds received by the related publications are examined. The National Science Foundation gave the researchers the most support on this issue. The number of
funds given by the institutions following the National Science Foundation are
close to each other.

When the most cited publications on the subject are examined, it is seen
that "Teaching disciplinary literacy to adolescents: Rethinking content-area
literacy" by Shanahan T., and Shanahan, C. “What is disciplinary literacy and
why does it matter?” by the same authors. It is seen that his publications are
among the ten most cited publications. The fact that each of the articles in the
top ten was published in different journals can be considered as an indicator of
the multidisciplinary nature of the subject. In addition, the prominence of
discipline-specific literacy such as mathematical literacy due to international
exams such as PISA may be one of the reasons for this situation.

Finally, co-word analysis was performed in the study. Thus, the current
research on the use of literary elements in mathematics education and the
conceptual structure of the relevant subject have been revealed. Especially
after 2012, the prominence of keywords such as content literacy, disciplinary
literacy, storytelling, digital storytelling, pre-service teachers, picture
books/children's books and professional development suggests that the
professional development and storytelling processes of teacher candidates and
in-service teachers gain importance. Research on the subject is carried out
using digital media or picture books. However, the trend of research is moving
towards teacher education. When the frequencies of the keywords are
examined, it is noticed that the studies on the subject still focus on the early
childhood period and children's books. This is in line with the findings of
Edelman et al. (2019). This situation can be considered as a research gap in the
context of studies to be carried out with different grade levels. Because, in the
literature, it is noted that very few of the studies on the subject are conducted
experimentally, while the studies are mostly carried out at the early childhood
level (Clarissa et al., 2021; Edelman et al., 2019). The fact that the studies are
mostly carried out in this age range may cause pre-service and in-service
teachers to hold negative beliefs about the use of literary elements in
mathematics education. Because there is still not enough evidence about how
books and other literary elements other than children's books can contribute to
mathematics teaching (Jett, 2014; Nurnberger-Haag et al., 2020). Therefore,

Conclusions and Limitations

There are some limitations of this study, in which bibliometric and
descriptive analyzes of articles about the use of literary elements in
mathematics education are applied. First of all, the data of the study were
obtained only from the Scopus database. The studies obtained from WOS were
also accessed, but since VOSviewer, the tool used in the analysis, could not
process the data obtained from these two different databases together, the
study was conducted with the Scopus database, which gave much more
documents as a result of the literature search. In the future, more inclusive
studies can be carried out by using other analysis tools with data from more
than one database. Another limitation of the study is related to search
strategies. Before literature search, the keywords frequently used in studies on
the subject were examined and a search code was created accordingly. Since
the selected keywords were searched in the title, abstract and keywords
section, a large body of research were reached in the first search. The reason
for this situation is that, as seen in the findings of the research, the studies on
the subject have spread to many different fields and to many different journals.
The researcher/s benefited from such a search strategy because they wanted to
include all studies that may be relevant to the subject. Then, in order to
eliminate irrelevant studies, a data cleaning process was carried out and the
abstracts of the studies were examined. Thus, a literature review was
conducted that is both comprehensive enough to reach all the studies on the
subject and limited enough to exclude irrelevant studies. In the future, research
can be carried out by choosing more specific keywords, but the aim of this
study is to draw a framework as inclusive as possible for researchers interested
in this subject. Finally, the last access date of the data obtained through Scopus
is 09.21.2021. Since new studies are included in the databases every day, it is
possible to reach different results in future studies. Despite all its limitations, it
is thought that the framework and landscape that figured out as a result of this
research can support researchers, decision makers, practitioners and
stakeholders who are interested in this subject to take the necessary
precautions for the following years.

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