



# Journal of Advanced Research in Applied Sciences and Engineering Technology

Journal homepage:  
[https://semarakilmu.com.my/journals/index.php/applied\\_sciences\\_eng\\_tech/index](https://semarakilmu.com.my/journals/index.php/applied_sciences_eng_tech/index)  
ISSN: 2462-1943



## The Use of Technology and Media in Japanese Language Learning: A Bibliometric Analysis

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| ARTICLE INFO   | ABSTRACT   |
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| <p><b>Article history:</b><br/>Received 24 September 2023<br/>Received in revised form 13 December 2023<br/>Accepted 27 December 2023<br/>Available online 24 January 2024</p> <p><b>Keywords:</b><br/>Bibliometric; Japanese language;<br/>Japanese learning; Media; Technology</p> | <p>The integration of technology into language learning has led to increased research on the use of technology and media in language learning in recent years. This study presents a bibliometric analysis of the scientific literature related to the use of Technology and Media in Japanese Language Learning. Bibliometric methods are used in the analysis of scientific articles indexed on the Google Scholar database from 2018-2023, and linked to the research areas of Technology/Media in Japanese Language Learning. The research results show that the number of publications related to technology and media in Japanese language learning has increased in recent years. As the results of this research, publication related to technology and media in Japanese language learning is a growing trend that will lead to more research in the coming years. This study identifies opportunities for future research and pedagogical advances in Japanese language learning. Thus, it can become a source of information about innovation research in Japanese language learning.</p> |

### 1. Introduction

Seeing the development of students that keeps in line with technological advances as well as the demand of the global market towards educational goals makes the needs of students more varied [1-9]. Technology has also been integrated in language learning and teaching [10-11]. Japan as one of the global market demand centers, especially with regard to technology transfer, industry, culture, and education, is increasingly emphasizing the direction of openness to public interest in international interaction and communication in response to such global demand. One way to fulfill the market demand is to communicate in Japanese. There are more than 2,5 million people scattered around the world speaking in Japanese [12-14]. From these data, students are generally interested in learning Japanese. Thus, they can communicate in Japanese and work. Specifically, many students are interested in Japanese culture, such as drama, animation, and sports [15-17]. As time goes by, interest in the Japanese language has increased. This is evident from the many formal and informal Japanese language educational institutions spread around the world.

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Technological advances have changed the way people communicate and disseminate information [16,20-25]. The developments and changes have always had an impact on all aspects of life, including the communication and dissemination of information to the birth of ICT (Information and Communication Technology) and has an enormous impact on technological development in education and learning [22, 26-28]. In addition to the use of ICT products such as photos, audio, or video, ICT products like digital quizzes, online evaluations, and games can also be used in language learning [25, 29-31].

Language learning requires the creativity of teachers to be able to carry out learning activities effectively because creativity in the development of teaching materials and media can increase learning motivation in language learning [16,25,32-36]. The media can facilitate the process of delivering material and make the learning process more interesting [16,17,25,33].

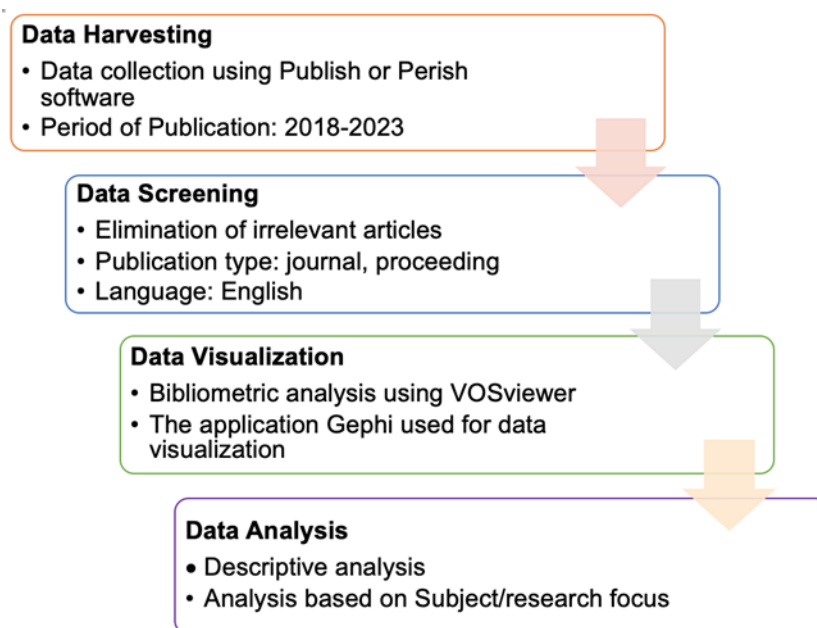
The involvement of technology in the learning of Japanese is closely related to the process of learning the four skills of the Japanese language. To support successful Japanese language learning and education, it is necessary to involve technology in the [23,24,37]. Technology has an important role in such involvement because the use of technology can support the development of materials, educational media, and tasks in learning to write, read, listen, and speak Japanese [17,19,32,34].

Research on the use of technology-based learning media in Japanese language learning has been done extensively and has proved to have a positive influence and impact on learning Japanese [38-41]. Earlier research has shown that technology-driven learning media have positive effects such as increased vocabulary mastery, kanji writing and sentence writing skills, Japanese speaking skills, and increased motivation of learners to read Japanese readings [19,23,43].

Many reports on technology, media, and learning Japanese has been done, but there is no publication of research using bibliometric analysis related to Japanese language learning. Bibliometrics is a method that can be used to explore and visualize research and literature trends in various disciplines [44-46]. The research is expected to be a reference for researchers to undertake research and determine research topics in the field of Japanese language education, especially topics related to technology, media, and learning Japanese.

## **2. Methodology**

All bibliographical information from articles that were published between 2018 and 2023 and were indexed by Google Scholar was used in this study. The Publish or Perish reference management application (which was accessed on 21 August 2023) is used for data collection. Afterward, the data from the Publish or Perish results will be saved in two formats: \*.ris (for data mapping with the VOSviewer program) and \*.csv (for data processing in Ms. Excel). After the data collection, we create a scientometric network that maps productivity using the VOSviewer application, a data visualization tool that creates a network from pre-processed data sets. For data searches, the keywords "Japanese Language", "Japanese Language Learning", "Japanese Language Education", "Media", and "Technology" are utilized. Additional details about the steps taken throughout the bibliometric analysis investigation are provided in Figure 1. Detailed information regarding the bibliometric analysis is explained in previous studies [47-48]. Table 1 shows previous studies on bibliometric analysis.



**Fig. 1.** The steps taken throughout the bibliometric analysis investigation

**Table 1**

Previous studies on bibliometric analysis

| No | Title   | Ref. |
|----|---|------|
| 1  | Dental suction aerosol: Bibliometric analysis.  | [49] |
| 2  | A bibliometric analysis of Covid-19 researches using VOSViewer.   | [50] |
| 3  | The latest report on the advantages and disadvantages of pure biodiesel (B100) on engine performance: Literature review and bibliometric analysis                                 | [51] |
| 4  | A bibliometric analysis of management bioenergy research using VOSviewer application  | [52] |
| 5  | Oil palm empty fruit bunch waste pretreatment with benzotriazolium-based ionic liquids for cellulose conversion to glucose: Experiments with computational bibliometric analysis  | [53] |
| 6  | Biomass-based supercapacitors electrodes for electrical energy storage systems activated using chemical activation method: A literature review and bibliometric analysis.         | [54] |
| 7  | Bibliometric analysis of nano metal-organic frameworks synthesis research in medical science using VOSViewer  | [55] |
| 8  | Past, current and future trends of salicylic acid and its derivatives: A bibliometric review of papers from the Scopus database published from 2000 to 2021.                      | [56] |
| 9  | Correlation between process engineering and special needs from bibliometric analysis perspectives.  | [57] |
| 10 | Bibliometric analysis for understanding the correlation between chemistry and special needs education using VOSviewer indexed by Google.  | [58] |
| 11 | Computing bibliometric analysis with mapping visualization using VOSviewer on “pharmacy” and “special needs” research data in 2017-2021.  | [59] |
| 12 | Nutritional research mapping for endurance sports: A bibliometric analysis.   | [60] |
| 13 | Bibliometric and visualized analysis of scientific publications on geotechnics fields.  | [61] |
| 14 | A bibliometric analysis of computational mapping on publishing teaching science engineering using VOSviewer application and correlation.  | [62] |
| 15 | What is the correlation between chemical engineering and special needs education from the perspective of bibliometric analysis using VOSviewer indexed by Google Scholar?         | [63] |
| 16 | Counselling guidance in science education: Definition, literature review, and bibliometric analysis.  | [64] |
| 17 | Phytochemical profile and biological activities of ethylacetate extract of peanut ( <i>Arachis hypogaea</i> L.) stems: In-vitro and in-silico studies with bibliometric analysis. | [65] |
| 18 | A bibliometric analysis of materials research in Indonesian journal using VOSViewer   | [66] |
| 19 | Research trend on the use of mercury in gold mining: Literature review and bibliometric analysis  | [67] |
| 20 | Bibliometric analysis of educational research in 2017 to 2021 using VOSViewer: Google Scholar indexed research.   | [68] |
| 21 | Bibliometric analysis of special needs education keyword using VOSviewer indexed by Google Scholar  | [69] |

**Table 1 (continue)**

Previous studies on bibliometric analysis

| No | Title   | Ref. |
|----|---|------|
| 22 | Sustainable development goals (SDGs) in science education: Definition, literature review, and bibliometric analysis.  | [70] |
| 23 | Computational bibliometric analysis of research on science and Islam with VOSViewer: Scopus database in 2012 to 2022.   | [71] |
| 24 | Resin matrix composition on the performance of brake pads made from durian seeds: From computational bibliometric literature analysis to experiment.                                | [72] |
| 25 | Bibliometric Analysis of Briquette Research Trends During the Covid-19 Pandemic.  | [73] |
| 26 | Computational Bibliometric Analysis on Publication of Techno-Economic Education.  | [74] |
| 27 | How bibliographic dataset portrays decreasing number of scientific publications from Indonesia  | [75] |
| 28 | Research trends from the Scopus database using keyword water hyacinth and ecosystem: A bibliometric literature review   | [76] |
| 29 | Bibliometric analysis of high school keyword using VOSviewer indexed by google scholar  | [77] |
| 30 | How to calculate bibliometric using VOSviewer with Publish or Perish (using Scopus data): Science education keywords  | [78] |
| 31 | Bibliometric analysis for understanding "science education" for "student with special needs" using VOSViewer  | [79] |
| 32 | Bibliometric analysis of research development in sports science with VOSViewer.   | [80] |
| 33 | Bibliometric analysis of engineering research using VOSviewer indexed by Google Scholar   | [81] |
| 34 | Bibliometric computational mapping analysis of publications on mechanical engineering education using VOSViewer   | [82] |
| 35 | Introducing ASEAN Journal of Science and Engineering: A Bibliometric Analysis Study   | [83] |
| 36 | Introducing ASEAN Journal of Science and Engineering Education: A Bibliometric Analysis Study for Understanding Internationalization  | [84] |
| 37 | Exploring Iron Oxide's Role in Hydrogen Production: Bibliographic and Bibliometric Analysis   | [85] |
| 37 | How Technology Can Change Educational Research? Definition, Factors for Improving Quality of Education and Computational Bibliometric Analysis                                      | [86] |
| 38 | Is Universitas Pendidikan Indonesia Ready for Internationalization? A Bibliometric Analysis in The Science and Technology-Related Publications                                      | [87] |
| 39 | Social Impact and Internationalization of "Indonesian Journal of Science and Technology" the Best Journal in Indonesia: A Bibliometric Analysis                                     | [88] |
| 40 | Mapping of nanotechnology research in animal science: Scientometric analysis  | [89] |
| 41 | Strategies in language education to improve science student understanding during practicum in laboratory: Review and computational bibliometric analysis                            | [90] |
| 42 | How language and technology can improve student learning quality in engineering? definition, factors for enhancing students' comprehension, and computational bibliometric analysis | [91] |
| 43 | Involving particle technology in computational fluid dynamics research: A bibliometric analysis   | [92] |

### 2.1 Tools and Materials

The first step in conducting a bibliometric analysis is to make the appropriate preparations for the tools and resources to be used in the analysis. Data on search results must be prepared for the following applications: Publish or Perish (PoP), which is used to find and collect article data based on keywords, Microsoft Excel, which is used to analyze and screen search result data, and finally VOSviewer, which is used for visualization and mapping.

### 2.2 Data Collection

In this step, the information based on the keywords used for publishing trend analysis is gathered. The Publish or Perish program has been used to collect published articles on the topics of "Japanese Language", "Japanese Language Learning", "Japanese Language Education", "Media", and

"Technology" were gathered. Article data from the most recent five years, from 2018 to 2023, comprise the data collected.

### *2.3 Data Screening*

The research papers gathered during the data collection stage cannot be directly analyzed, thus, data filtering was required. The year of publication has been taken into consideration while sorting the data. And even though an article's publication year is missing, its information is nevertheless included. The articles used as data in this study were sourced from journals and proceedings. 500 papers were gathered in the harvesting data step, and 138 papers were selected while some articles were not used because their metadata was insufficient.

### *2.4 Data Visualization*

To obtain data visualization, data that has been saved in the (\*.ris) format is then submitted to the VOSviewer program. The terms in the VOSviewer network mapping visualization are filtered at this stage. The article data is mapped based on the source database. This study uses three different methods of visualization, namely network visualization, overlay visualization, and density visualization.

### *2.5 Data Analysis*

In the last stage, the visualized data was analyzed to provide results that will be discussed in the "results and discussion" section. The data analysis procedure was simplified by using the features of Microsoft Excel.

## **3. Results and Discussion**

### *3.1 Research Tendency on Japanese Language and Japanese Language Education*

The trends in themes and topics raised by research related to Japanese Language and Japanese Language Education can be seen from the findings of which terms appear frequently. The total terms found were 148 terms. In more detail, the 20 most frequently found terms in the Japanese Language and Japanese Language Education research can be seen in Table 2. Of the 20 most frequently appearing terms, the 5 most frequently appearing terms were "Japan", which appeared 355 times, "Study" 216 times, "Language" as many as 93 times, "Technology" 92 times, and "Education" 86 times.

The data on the 138 terms found can be visualized by showing the relationship between terms as in Figure 2. 138 terms are divided into 7 clusters as follows:

- (i) Cluster 1 in red has 28 items including additional language, book, chapter, class, classroom, context, English, English language teaching, foreign language, foreign language teaching, interaction, language, language teaching, learner, learning, motivation, practice, pragmatic, process, research, review, second language, second language acquisition, social medium, task, teaching, theory, and use.
- (ii) Cluster 2 in green has 27 items including application, art, artificial intelligence, chatbot, education, education technology, experience, field, foreign language education, future, interest, issue, Japanese culture, Japanese language, Korea, language education, language learning, new

technology, paper, participant, person, systematic review, technology, term, trend, type, and year.

- (iii) Cluster 3 in dark blue has 25 items including article, case study, challenge, child, China, development, example, Germany, government, history, industry, Japan, Japanese word, nation, opportunity, period, role, science, society, Taiwan, time, Tokyo, united states, university, and word.
- (iv) Cluster 4 in yellow has 24 items including achievement, case, course, east Asia, effort, English medium instruction, higher education, implementation, instruction, Japanese, Japanese student, Japanese university, language teacher, lesson study, level, medium, researcher, school, sense, subject, success, text, volume, and work
- (v) Cluster 5 in purple has 19 items including age, analysis, association, COVID, data, financial literacy, group, impact, Japanese government, Japanese person, Japanese population, Japanese society, Japanese version, pandemic, population, present study, relationship, student, and study.
- (vi) Cluster 6 in light blue has 11 items including change, country, culture, effect, English language, Finland, inclusive education, need, online, self-efficacy, and teacher.
- (vii) Cluster 7 in violet has 4 items including crisis, lesson, number, and world.

**Table 2**

20 Terms Most Often Found in Japanese Language and Japanese Language Education Research

| No | Term              | Occurrences |
|----|-------------------|-------------|
| 1  | Japan             | 355         |
| 2  | study             | 216         |
| 3  | language          | 93          |
| 4  | technology        | 92          |
| 5  | education         | 86          |
| 6  | student           | 55          |
| 7  | learning          | 51          |
| 8  | English           | 47          |
| 9  | research          | 43          |
| 10 | use               | 38          |
| 11 | development       | 37          |
| 12 | language learning | 36          |
| 13 | covid             | 35          |
| 14 | analysis          | 34          |
| 15 | course            | 32          |
| 16 | medium            | 32          |
| 17 | society           | 32          |
| 18 | language teaching | 31          |
| 19 | lesson            | 30          |
| 20 | teaching          | 30          |

The findings of terms in publications on Japanese language and Japanese language education are visualized through density visualization in Figure 3.

Based on the data terms that appear most frequently in Table 2, Figure 2, and Figure 3, it can be seen that the themes or topics that tend to be discussed in research publications on Japanese Language and Japanese Language Education include Japanese language, Japanese language teaching and learning, technology, and media use and development.



presented in interesting learning media to facilitate communicative and collaborative teaching and learning approaches [93-94,99-100].

As with language learning in general, the use of media in learning Japanese also has a positive influence and impact [38-42]. Learning media has a positive impact on Japanese language learning activities, such as increasing vocabulary mastery, the ability to write kanji and writing sentences, as well as increasing their motivation to read Japanese literature [38-39].

Learning media used in language learning in general and in Japanese language learning have various forms, such as text textbooks, images, diagrams, videos, audio, PowerPoint presentation, software, etc [101-104]. Based on the results of harvesting data, it is known that 183 studies discussed the use and types of language learning media. The types of learning media are stated in Table 3. The 3 types of media most discussed in research are media in the form of applications with 56 studies, media in the form of multimedia with 53 studies, and media in the form of games with 20 studies.

**Table 3**  
Types of Learning Media in Language Learning

| No | Type of Media | Amount of Article |
|----|---------------|-------------------|
| 1  | Game          | 20                |
| 2  | Application   | 56                |
| 3  | Animation     | 9                 |
| 4  | Multimedia    | 53                |
| 5  | Comic         | 11                |
| 6  | Culture       | 2                 |
| 7  | Book          | 13                |
| 8  | Card          | 3                 |
| 9  | Movie         | 5                 |
| 10 | Audio         | 3                 |
| 11 | Video         | 1                 |
| 12 | Sport         | 1                 |
| 13 | Image         | 1                 |
| 14 | Origami       | 1                 |
| 15 | Dance         | 1                 |
| 16 | Dakwah        | 2                 |
| 17 | Photo         | 1                 |

By searching for the keywords “Japanese language”, “Japanese language learning”, “Media”, “Learning media”, and “Technology”, data was obtained showing that as many as 67 research publications were research related to learning media used in Japanese language learning. From the 17 types of learning media in language learning in Table 2, several types of media are often used. The types of media most used in Japanese language learning are as follows.

- (i) Multimedia [19,102,105-114]. Combining multimedia with text-based materials or textbook learning can increase the effectiveness of Japanese language learning [109-110,115]. That combination allows students to study Japanese thoroughly and in-depth to improve their proficiency in Japanese [114].
- (ii) Application [10,27,95,116-132]. Using application as a medium for Japanese language learning makes learning easier and more effective [8,117-118]. Application has a variety of convenience, flexibility, interactivity, and a variety of material resources to help students acquire four Japanese language skills effectively [130].
- (iii) Anime [133-137]. Using anime as a medium for Japanese language learning can be a fun and effective learning approach [136-140], especially for students who like anime as a source for



learning Japanese. Anime can be used as a learning medium to train listening skills, vocabulary knowledge, pronunciation skills, and understanding of Japanese culture.

- (iv) Manga (Japanese Comics) [139-143]. Manga (Japanese comics) as a learning medium must be used with other learning media such as textbooks, audio, and videos [140, 142-143]. Through Rich Visual Context using Authentic Language, manga can be used in Japanese language learning to improve vocabulary knowledge, reading ability, and understanding of Japanese grammar [139].
- (v) Game [144-154]. Learning media in the form of games can be used to practice Japanese language skills in an interactive and challenging atmosphere [148-149]. Games increase student involvement and motivation in learning [150-154] because interesting and fun games can increase student motivation to learn Japanese [155-157]. The existence of achievements, competition, and progress in a game can also make students actively involved in the learning process.

Based on searching for the keywords "Japanese", "Japanese Language Learning", "Media", "Learning Media", and "Technology", it is known that the publication of articles related to the field of Technology / Media in the Japanese Language highlights the importance of using diverse learning media as effective, innovative and interesting learning media. The use of learning media combined with text-based materials or textbooks allows students to have an immersive and thorough learning experience, thus improving their understanding of the Japanese language. It is important to adjust the advantages of each type of learning media to students' preferences and interests because the use of appropriate learning media has a significant impact on the effectiveness of the Japanese language learning process. Innovations in the use of learning media can increase flexibility, and interactivity of learning to make the process of learning Japanese more accessible and effective.

### *3.3 Use of Technology-Based Learning Media in Japanese Language Learning*

Technological developments in learning have an impact on foreign language learning, including Japanese language learning [22,19,27,94]. Currently, learning Japanese involves a lot of technology in the use of learning media [93,94,158-159]. The involvement of technology in learning media generally takes the form of e-books, PowerPoint, audio-visual media in the form of YouTube videos, and audio that can be accessed from popular applications such as podcasts, Spotify, iTunes, etc [6,115,159-163].

Of the 67 research publications related to the use of media in Japanese language learning, there are 64 studies that more specifically discuss the use of technology-based learning media. Data on the types of technology-based learning media used in Japanese language learning can be seen in Table 4.

From the 17 types of technology-based learning media discussed in research publications related to Japanese language learning in Table 3, media in the form of applications is the most widely discussed type of media (15 articles). Next, the most technology-based learning media discussed in research publications are multimedia learning media with 17 articles, anime (Japanese cartoons) as learning media with 7 articles, games with 7 articles, and social media with 7 articles. The types of technology-based media most used in Japanese language learning are as follows:

- (i) Application [164-174]. As explained in the previous section, applications as a medium for Japanese language learning provide various conveniences to make learning more flexible and interactive [171-172]. As one of the technology-based learning media that appears most often in research publications, applications have various types that can be adapted to Japanese language learning materials. The types of applications that appear in research publications on Japanese

language learning are vocabulary applications [166,171,174], translation applications [173] and audio and video player applications.

- (ii) Multimedia [19,169, 175-184]. Similar to the findings in the previous section, multimedia media is also widely discussed in research publications related to technology-based learning media in Japanese language learning. Multimedia as a basic product of technology-based learning media [170,183] is still widely used by Japanese language teachers [106] because the combination of audio and visual media is still an interesting feature that can increase students' interest in learning [96].
- (iii) Anime [133-134, 185-189]. Anime is one of the audio-visual-based Japanese pop culture products that are available and widely distributed on digital platforms, making it one of the right choices to use as a technology-based Japanese language learning medium [133]. The audio-visual features of anime can develop listening and speaking skills because students will become familiar with Japanese pronunciation and intonation [134]. By using anime as a learning medium, teachers can introduce new vocabulary related to various themes from the anime used [188]. Thus, vocabulary mastery can increase.
- (iv) Games [144,146,190-192]. Game features can be used in the context of gamification to maintain student motivation and interest, facilitate communication, and improve Japanese learning success. Even so, the effectiveness of using games in learning can vary, depending on the design of the type of game, as well as student preferences. Therefore, it is important to adjust the selection of games to the learning materials and interests of students to support the four Japanese language skills and achieve Japanese learning targets or achievements.
- (v) Social Media [181,193-196]. SNS can create collaborative learning [193]. Thus, teachers and students can collaborate and discuss to support the improvement of Japanese language skills. The "affordability" nature of SNS is one of the factors to support the improvement of language skills, especially when using gadgets in learning. SNS has a positive impact on Japanese language learning activities, such as increasing vocabulary mastery, the ability to write kanji and writing sentences, and increasing their motivation to read Japanese texts [39].

**Table 4**  
 Types of technology-based learning media used in Japanese language learning

| No | Types of technology-based media | Amount of article |
|----|---------------------------------|-------------------|
| 1  | Virtual Reality                 | 1                 |
| 2  | Game                            | 7                 |
| 3  | UI/UX Design Application        | 1                 |
| 4  | Vocabulary Application          | 5                 |
| 5  | Translation Application         | 2                 |
| 6  | Online Meeting Application      | 3                 |
| 7  | Video Player Application        | 2                 |
| 8  | UI Framework Application        | 1                 |
| 9  | Anime                           | 7                 |
| 10 | Movie                           | 3                 |
| 11 | Online Comics                   | 2                 |
| 12 | Audio Player Application        | 1                 |
| 13 | Multimedia                      | 17                |
| 14 | Social Media                    | 7                 |
| 15 | Augmented Reality               | 2                 |
| 16 | Online Video Application        | 2                 |
| 17 | Photo                           | 1                 |

Research publications related to the use of technology-based learning media in Japanese language learning provide an overview of the development of technology-based learning media in Japanese language education that is dynamic following the times and technology. The findings in the research publication revealed that technology-based media combined with certain learning methods and approaches are widely used to improve Japanese language learning outcomes, giving birth to the types of technology-based learning media that are popularly used. The variety of types of technology-based learning media makes Japanese language learning more accessible, and interesting, and following students' interests and preferences.

#### 4. Conclusions

This study aims to examine growth trends in the field of Technology/Media in Japanese Language Learning research from 2018 to 2023. Bibliometric analysis and theoretical analysis are used as research techniques. The stages of the research are as follows: (i) harvesting; (ii) screening; (iii) visualizing; and (iv) analysing data published results. In the search results, the terms "Japan" appeared 355 times, "Study" as many as 216 times, "Language" as many as 93 times, "Technology" as many as 92 times, and "Education" as many as 86 times. Based on the results of harvesting data about the use of media in learning Japanese, the 3 types of media most discussed in the research are applications with 56 studies, multimedia with 53 studies, and games with 20 studies. In the search results research publications related to technology-based learning media, are multimedia learning media with 17 articles, anime (Japanese cartoons) as learning media with 7 articles, games with 7 articles, and social media with 7 articles. As the results of this research, publication related to technology and media in Japanese language education is a growing trend that will lead to more research in the coming years. This study identifies opportunities for future research and pedagogical advances in Japanese language learning. Thus, it can become a source of information about innovation research in Japanese language education.

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