



Bibliometric Analysis: Research on Articulate Storylines in Mathematics Learning

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abstract

Articulate Storyline is part of the media authoring tools that can be used in making a product, especially for teaching tools that have been combined into one that contains images, videos, text, sound, drafts, and learning animations. This study aims to capture the landscape of previous research that is relevant to the Articulate Storyline in mathematics learning in the last decade, from 2013 to 2022 using bibliometric analysis. The data taken from the Google Scholar database was refined so that it became 111 publications. The publication trend related to Articulate Storyline in mathematics learning has increased every year, starting from 2019 to 2022, the most publications occurred in 2022 with 58 documents. Publications in 2020 have been cited in more than 180 citations. The focus of research related to Adobe Flash in learning mathematics is 1) critical thinking ability and motivation; 2) understanding mathematics, technology and elementary school; 3) development and junior high school; 4) mathematics and outcomes.

Keywords:

Articulate Storyline; Bibliometric; Mathematics Learning



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INTRODUCTION

Articulate Storyline is software that is used as a presentation or communication medium (Firdaus et al., 2022; Sindu et al., 2020). Articulate Storyline software can be used as a media presentation in learning, this is in accordance with what was conveyed by (Kurniawan & Amiruddin, 2022) that Articulate Storyline is software or software that has a function as a medium in interactive learning. Meanwhile, according to (Indasari & Budiyo, 2019; Wahyudin et al., 2022) Articulate Storyline is part of the media authoring tools so that it can be used in making a product, especially for teaching tools that have been combined into one that contains images, videos, text, sound, drafts, and learning animations. So, Articulate Storyline is an application that can be used as an interactive learning media.

Articulate storyline is software that looks like PowerPoint but has excellent features (Istiyadi et al., 2022). Articulate storyline has a diverse and attractive appearance and is very easy to use (Fatikhah & Anggaryani, 2021). Not only does it look attractive, the sound or music that is displayed can also vary, Articulate storyline learning media can make students focus on learning, and teachers can easily convey learning material (Nugroho & Arrosyad, 2020). Besides that, Articulate storyline media also has other advantages, namely, Articulate Storyline can be accessed offline (Kristiani et al., 2022). Articulate Storyline does not require programming languages or scripts in the creation process (Syah et al., 2020).

Mathematics is an important science for students to acquire which is useful in solving problems in everyday life (Marchy et al., 2022; Mayani et al., 2022). According to (Wijayanti et al., 2022) the use of Articulate Storyline as a learning medium can improve students' critical thinking skills. In addition to improving students' critical thinking skills, Articulate Storyline learning media also improves students' problem solving abilities (Siagian & Armanto, 2022).

Research related to Articulate Storyline has been widely carried out in Education. not only in the field of education in general, but research related to Articulate Storyline in mathematics learning has also increased recently. This is in accordance with the results of research conducted by (Muhammad, Mukhibin, et al., 2022) that one of the new themes in research on instructional media is Articulate Storyline. This means that Articulate Storyline is a research theme that has attracted the interest of researchers lately.

Studies related to Articulate Storyline in mathematics learning needs to be analyzed, for this we need an analytical method. According to (Muhammad et al., 2023; Muhammad, Marchy, et al., 2022) to analyze publications in various journals can be analyzed using the bibliometric method with a predetermined theme. In searching for data, a database is also needed. In this study, researchers used the Google Scholar database. According to (Mondal et al., 2022) Google Scholar is a free search engine that provides information about scientific articles available on the Internet.

Previous studies like that done by (Muhammad, Mukhibin, et al., 2022) who examines the bibliometric analysis of instructional media in mathematics learning, the results of this study indicate that the keyword Articulate Storyline is the keyword that becomes the new theme, as for the suggestions given, namely that future researchers make these new keywords a research theme using bibliometric analysis. Departing from the previous studies, the researcher wanted to analyze research related to Articulate Storyline learning media in learning mathematics using bibliometric analysis. The purpose of this study is to determine the Articulate Storyline research trends in mathematics learning during the last decade.

METHODS

The method used in this research is bibliometric analysis. Researchers collected data using the Google Scholar database. According to (Moher et al., 2009) In the process of collecting data, there are several steps taken, starting from identification, screening, eligibility, and inclusion. The data collection process can be seen in Figure 1 below as follows.

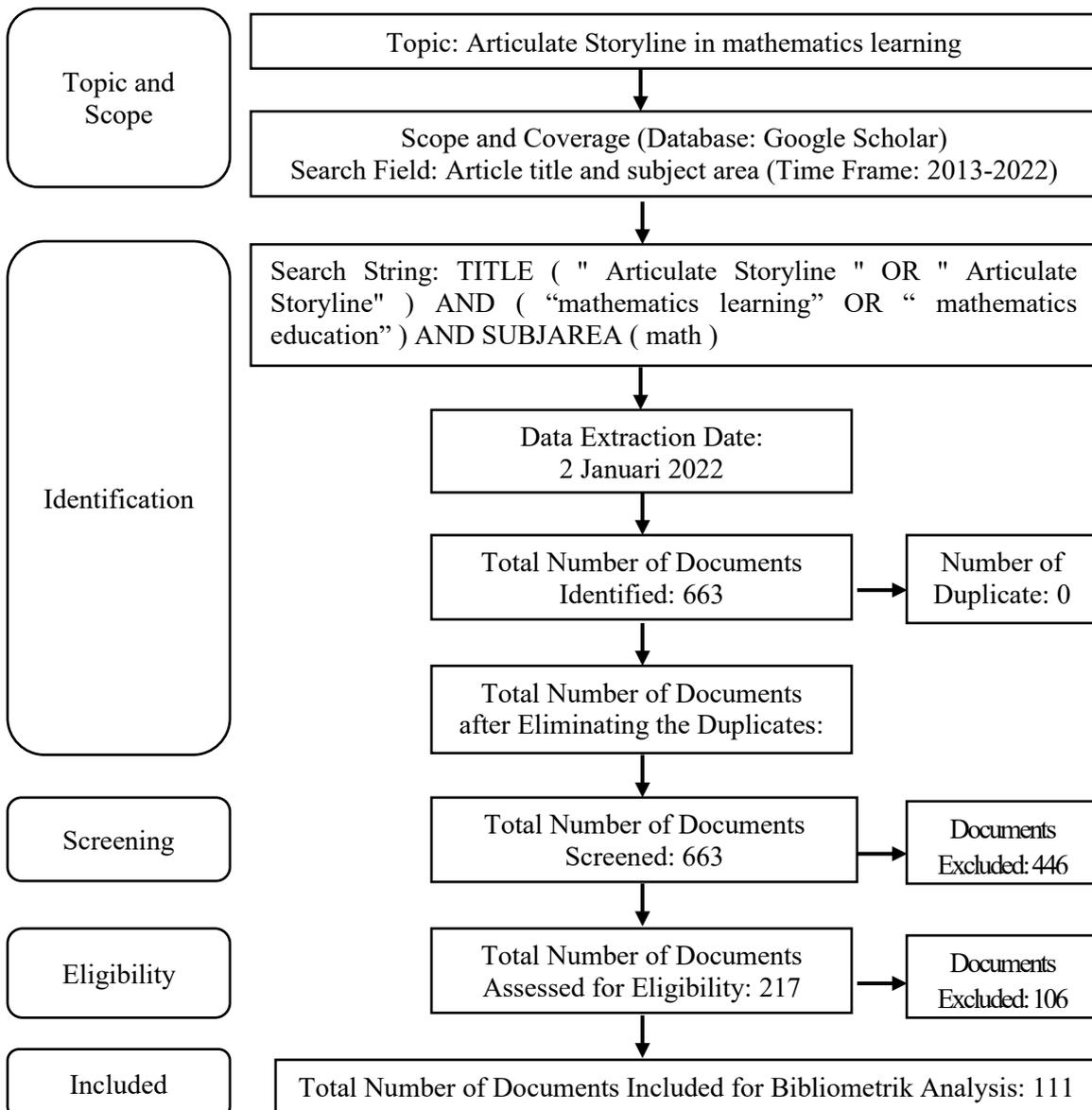


Figure 1
Data collection process

The first step is that the researcher identifies research related to the Articulate Storyline in mathematics learning by entering keywords in the scholar database using the PoP (Publish or Perish) application. PoP is a program that retrieves scholarly citations from several input sources (Sergesketter & Duffy, 2023). At this stage, 243 articles have been obtained according to the first step criteria. Then the second step is the screening process where only Indonesian and English are entered for the next process. Researchers only enter articles published in journals. In this second stage, researchers have filtered 446 articles so that the remaining 217 articles will be continued in the next stage. In the third stage, the researcher assesses the feasibility of the article, the researcher looks at the title of the article and the abstract, whether it is in accordance with the criteria that the researcher needs, such as whether it contains an Articulate Storyline in learning

mathematics or not. In the last stage the researcher included 111 articles from the previous data collection process. The data was taken on January 2, 2023, after the 111 articles were collected, the researchers stored them in the form of an RIS which would be analyzed using the VOSviewer application.

Data Collection and Analysis

The tendency of current publications related to Articulate Storyline in mathematics learning is by conducting descriptive analysis on bibliometric data taken from the Google Scholar database. The graph showing the number of publications and the cumulative number of publications each year was generated using Microsoft Excel 2016. The trend of citations from articles related to Articulate Storyline in mathematics learning will be separated by year of publication. As for the average publication citations as well as for calculating NCP, TP, C/P, TC, C/CP, h-index and g-index assisted by Harzing's Publish or Perish Software application. Event analysis with keywords related to Articulate Storyline in mathematics learning was carried out to determine the research focus. The data to be analyzed is taken from the Google Scholar database, which must first be processed. The research focus can be determined from shared keywords visualized by the VOSviewer Software.

RESULT AND DISCUSSION

Publication trends

The trend of publications related to Articulate Storyline research in mathematics learning in the last decade is shown in Figure 2. In 2022 there were 58 published articles, this being the most compared to any other year. meaning that more than 52 percent of articles have been published in 2022 of the total publications.

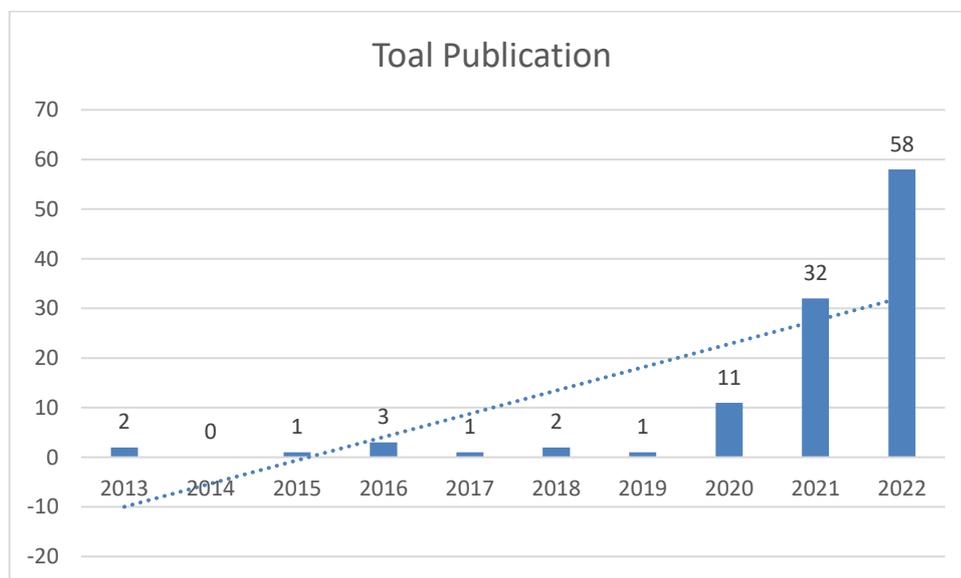


Figure 2

Number of Publications from 2013 to 2022

The increase can be seen from the research trend line, a significant increase in the number of articles seen from 2019 to 2022 where there has been a very rapid increase. In 2019 the number of publications was only 1 article, but in the following year it increased to 58 articles in 2022. This

shows that the great research interest in Articulate Storyline in mathematics learning in recent years.

Citation Trend

The trend of citations in the last decade, from 2013 to 2022, is related to Articulate Storyline in mathematics learning. Researchers calculate TP, NCP, C/P and others as in the following table.

Table 1
Citation Analysis of Publications

Year	TP	NCP	TC	C/P	C/CP	h	g
2022	58	11	52	0,90	4,72	4	6
2021	32	11	90	2,81	8,18	6	9
2020	11	9	188	17,09	20,88	6	11
2019	1	1	5	5	5	1	1
2018	2	2	112	56	56	2	2
2017	1	-	-	-	-	-	-
2016	3	-	-	-	-	-	-
2015	1	-	-	-	-	-	-
2014	-	-	-	-	-	-	-
2013	2	-	-	-	-	-	-

Notes. TP=total of publication, NCP=number of cited publication, TC=total citations, C/P=average citations per publication, C/CP=average citations per cited pblication, h=h-index, g=g-indeks

Table 1 above shows the total publications and total citations, in 2020 the articles published were lower than in 2022 but the number of citations in 2020 was far more compared to other years. 188 publications in 2020 have been cited. This means that publications in 2020 are the most influential regarding Articulate Storyline in learning mathematics. Furthermore, the h index and g index values are viewed based on the year of publication. Publications in 2020 apart from being widely cited also have the highest h index and g index values compared to other years, namely an h index of 6 and a g index of 11.

The highest NCP score was in publications in 2021 and 2022, namely 11 each, meaning that out of the 90 publications published in 2021 and 2022, at least 1 of the articles that have been cited is 22 articles, so there are many articles in 2021 and 2022 that have not been cited. cited or cited. As for the C/P value or publication citation and the C/CP value where publication in 2020 has a greater value than any other year.

Research focus

The research focus related to Articulate Storyline research in mathematics learning in the last decade is shown in Figure 3 below.

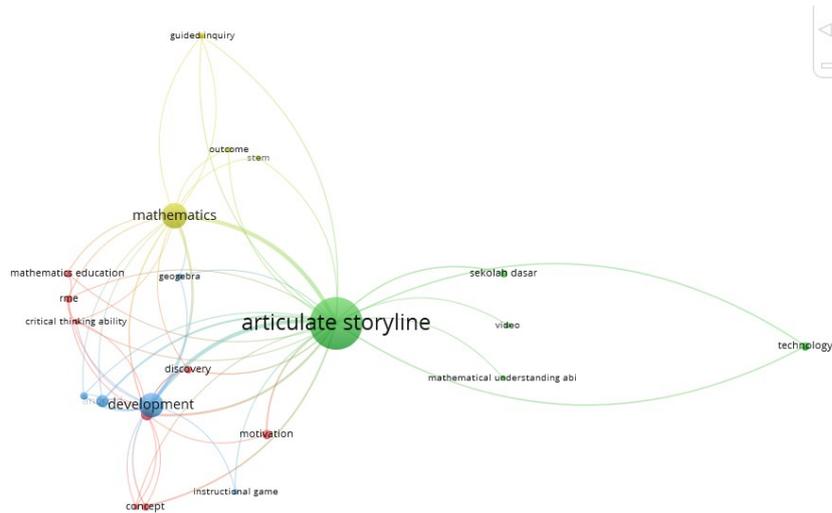


Figure 3
Keyword Co-occurrence (Occurrence Threshold ≥ 3)

Researchers set a threshold that is at least 2 publications that contain the same keywords. From these results, the 504 keywords were reduced to 24 keywords. The results of the network visualization in Figure 3 show that there are 4 clusters with 24 items regarding Articulate Storyline in Mathematics Learning, namely, 1) Cluster 1 (red in color) is the largest cluster consisting of 8 items, the keywords critical thinking ability and Motivation have the largest circle among other cluster 1, meaning that these keywords reflect the research focus together with Mathematics Education; 2) cluster 2 (in green) consists of 6 items, apart from the keywords Articulate Storyline, the keywords mathematical understanding, technology and elementary school have a larger circle than the others, meaning that the keywords mathematical understanding, technology and elementary school are the focus study; 3) cluster 3 (dark blue) consists of 5 items where the circles on the keyword development and junior high school are the largest in the cluster, meaning that these keywords reflect the focus of the research; 4) cluster 4 (yellow) consists of 5 items, where the circle on mathematics and outcomes is the largest in the cluster, meaning that these keywords reflect the research focus.

Discussion

This study aims to display the research landscape related to Articulate Storyline in mathematics learning from 2013 to 2022. In the following, the research questions will be discussed.

How are current research publication trends related to Articulate Storyline in mathematics learning?

The trend of publications related to Articulate Storyline in mathematics learning in the last decade has shown an increase every year from 2019 to 2022 which can be seen in Figure 1. The highest number of publications is in 2022 as many as 58 articles have been published in that year. Furthermore, the second highest number of publications occurred in 2021 where there were 32 articles published that year.

The least number of publications occurred in 2014, namely no published articles. This is not much different from the number of publications in 2015 and 2017, which only published 1 article. However, starting from 2020, there has been an increase regarding the publication of Articulate Storylines in learning mathematics.

What are the research citation trends related to Articulate Storyline in mathematics learning?

The trend of citations related to the publication of Articulate Storyline in mathematics learning in the last decade shows that publications in 2020 have been cited as many as 188 citations. This means that publications in 2020 are the most influential in this field, because publications in that year have been cited more than publications in other years. The top 4 documents based on the number of citations in 2020 with more than 10 citations can be seen in table 2 below as follows.

Table 2
Articles published in 2020

No	Author (year)	Title	Sources	Citation
1	(Saputro & Lumbantoruan, 2020)	Development of Articulate Storyline-Based Mathematical Learning Media on Flat Sided Space Material for Class VIII	EduMatSains : Jurnal Pendidikan, Matematika dan Sains	66
2	(Khusnah et al., 2020)	Development of amulet learning media using an articulate storyline	Jurnal Analisa	40
3	(Yahya et al., 2020)	Development of Flipped Classroom Learning Devices Characterized by Mini Projects	SJME (Supremum of Mathematics Education)	38
4	(Handayani et al., 2020)	Development of Articulate Storyline-Based Social Arithmetic Interactive Learning Media 3	Jurnal Pendidikan dan Pembelajaran Matematika Indonesia	23

In the table above, it can be seen that the research was conducted by (Saputro & Lumbantoruan, 2020) became an article published in 2020 that had the highest number of citations of the others, namely around more than 35 percent of the article was cited from the total citations in 2018. Research conducted by (Saputro & Lumbantoruan, 2020) with the title "Development of Articulate Storyline-Based Mathematical Learning Media on Flat Sided Space Material for Class VIII" has been cited 66 times. Article written by (Saputro & Lumbantoruan, 2020) widely cited because the article produces a product that has been validated with a very valid category, namely mathematics learning media on flat sided space material. Further research conducted by (Khusnah et al., 2020) also produce valid and practical products in learning mathematics.

Publications in 2020 that have the third highest number of citations, namely research conducted by (Yahya et al., 2020) with the title " Development of Flipped Classroom Learning Devices Characterized by Mini Projects " which discusses the development of learning tools with articulate storyline learning media, that these learning tools get a positive response from every student. Research conducted by (Handayani et al., 2020) which states that learning media made on Social Arithmetic material are valid to be used as media for learning mathematics.

From table 2 above, it can be concluded that research in 2020 mostly discusses the development of learning media using Articulate Storylines. The documents in table 2 above can be used as a reference for future researchers who will take themes related to Articulate Storyline in media learning. Table 2 above also shows journals that can be used as a place to publish articles that have been made.

What is the research focus of Articulate Storyline in learning mathematics?

The research focus related to Articulate Storyline research in mathematics learning is divided into four parts, namely, 1) critical thinking ability and motivation; 2) understanding mathematics, technology and elementary school; 3) development and junior high school; 4) mathematics and outcomes.

The focus of the first research is critical thinking ability and motivation. This is in accordance with what was conveyed by (Wijayanti et al., 2022) that the use of Articulate Storyline as a learning medium can improve students' critical thinking skills. In addition to increasing critical thinking skills, learning using Articulate Storyline can also increase student motivation (Sukmarini et al., 2021). The second research focus is understanding mathematics, technology and elementary school. It is clear that Articulate Storyline media is related to technology, but this media is a research theme that is often associated with mathematical understanding in elementary schools. This is in accordance with research conducted by (Nissa et al., 2021) that Articulate Storyline media in learning for students is able to develop the level of student understanding both from cognitive, procedural, and conceptual aspects.

The third research focus is development and junior high school. This is in accordance with research related to Articulate Storyline media in 2020 which can be seen in table 2, where the top 4 articles that have the highest number of citations have the same theme, namely development. This means that the research interest in the development of Articulate Storyline media is very large, this is certainly related to the level of education, one of which is at the junior high school level. The last or fourth research focus is mathematics and outcomes. It is clear that research related to Articulate Storyline in learning mathematics is related to mathematics. As for the relationship of this research with learning outcomes such as research conducted by (Mawaddah et al., 2022) that there is an influence of interactive multimedia based on Articulate Storyline on student thematic learning outcomes. The four parts of the research focus above can be used as a reference for future researchers who want to determine the focus and theme of their research related to Articulate Storyline in learning mathematics

CONCLUSION AND IMPLICATION

Conclusion

Based on the results and discussion, it can be concluded that the trend of publications related to Articulate Storyline in learning mathematics has increased every year, starting from 2019 to 2022. Publications in 2020 have cited more than 180 citations. The research focus related to Articulate Storyline in learning mathematics is 1) critical thinking ability and motivation; 2) understanding mathematics, technology and elementary school; 3) development and junior high school; 4) mathematics and outcomes. The four parts of the research focus above can be used as a reference for future researchers who want to determine the focus and theme of their research related to Articulate Storyline in learning mathematics. This research is only limited to learning mathematics, therefore for further research it is recommended to discuss the articulate storyline in education in general or in other fields of education.

Implication

The limitations of this study are in finding the data needed by researchers using the Google scholar database, it is hoped that for further research to find the required data with databases other than Google scholar.

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