**EMTEKA**: Jurnal Pendidikan Matematika
Volume 7, No. 1, 2026. 266-283
DOI: https://doi.org/10.24127/emteka.v6i1.11209

e-ISSN 2746-5594
p-ISSN 2746-5608

# USING MATIFIC FOR MATHEMATICS LEARNING: SYSTEMATIC LITERATURE REVIEW AND BIBLIOMETRIC ANALYSIS

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Received December 25, 2025; Received in revised form February 05, 2026; Accepted March 10, 2026

**ABSTRACT**
Research related to the use of the Matific platform in mathematics learning is still scattered with diverse focuses and contexts. The study aims to map the use of the Matific digital platform in mathematics learning through a Systematic Literature Review (SLR) combined with bibliometric analysis using the PRISMA protocol. The findings show that Matific is most widely used at the primary school level, with research concentrated in Brazil and Indonesia as the two countries with the highest number of publications. This platform consistently has a positive impact on student motivation and engagement in all studies reviewed, while improvements in student learning outcomes and conceptual understanding of mathematics are also widely reported, albeit with varying degrees of effectiveness depending on the different implementation contexts. These findings indicate that the effectiveness of Matific is highly dependent on the quality of pedagogical integration, teacher readiness, and the availability of technological infrastructure, rather than solely on the platform itself.
**Keywords**: digital platform; mathematics learning ; matific

***ABSTRAK***
*Penelitian terkait penggunaan platform Matific dalam pembelajaran matematika masih tersebar dengan fokus dan konteks yang beragam. Penelitian bertujuan untuk memetakan penggunaan platform digital Matific dalam pembelajaran matematika melalui Systematic Literature Review (SLR) yang dikombinasikan dengan analisis bibliometrik menggunakan protokol PRISMA. Temuan menunjukkan bahwa Matific paling banyak digunakan pada jenjang sekolah dasar, dengan penelitian yang terkonsentrasi di Brasil dan Indonesia sebagai dua negara dengan jumlah publikasi terbanyak. Platform ini secara konsisten memberikan dampak positif terhadap motivasi dan keterlibatan siswa pada seluruh studi yang ditinjau, sementara peningkatan hasil belajar dan pemahaman konseptual matematika siswa juga banyak dilaporkan meskipun dengan tingkat efektivitas yang bervariasi bergantung pada konteks implementasi yang berbeda. Temuan ini mengindikasikan bahwa efektivitas Matific sangat bergantung pada kualitas integrasi pedagogis, kesiapan guru, dan ketersediaan infrastruktur teknologi, bukan semata-mata pada platform itu sendiri.*
***Kata kunci****: matific; pembelajaran matematika; patform digital*



## Introduction

Technology has become an integral part of various aspects of life, including in the education sector (Salam et al., 2020). The integration of technology in learning offers various opportunities to improve the effectiveness of the learning process (Chima et al., 2024; Suyuti et al., 2023). Research conducted by (Shin et al., 2012) in

e-ISSN 2746-5594
p-ISSN 2746-5608

Michigan, United States, shows that technology-based learning significantly improves understanding in mathematics learning. In line with these findings, the Technological-Mathematical Knowledge for Teaching (T-MKT) framework emphasises that the integration of technology in mathematics learning is necessary to make learning more effective and relevant to the times (Andhin Dyas Fitriani, 2024).

In Indonesia, the transformation of digital technology in education, particularly in mathematics, is becoming increasingly relevant in line with the demand for strengthening numeracy literacy in accordance with the objectives of the Merdeka Curriculum (Mufliva, 2024). However, the implementation of digital technology in mathematics learning still faces significant challenges. Research conducted by (Risky et al., 2025) shows that the main challenges in the digitalisation of mathematics learning include gaps in students' basic numeracy skills and a lack of innovation in the learning process. The challenges of learning digitalisation are exacerbated by the fact that 67.11% of teachers experience difficulties in operating digital devices (Kemendikbudristek, 2021). This condition confirms that digital technology in learning is not yet fully optimised, partly due to limitations in digital literacy, particularly understanding the variety of digital platforms in mathematics learning that are appropriate to the needs.

The Matific platform is one of the technology-based mathematics learning platforms developed in collaboration with experts from Berkeley, Harvard, Stanford, and the Einstein Institute. This platform provides thousands of game-based activities. Research conducted by (Abdul Rahman, 2024) on the impact of the Matific platform on mathematics learning in the United Arab Emirates shows a significant improvement in the mathematical abilities of students who use Matific. A study by the University of Western Sydney also proves that using Matific in learning can improve test results by up to 34% with only 30 minutes of use per week (Catherine, 2016). These findings suggest that Matific has great potential as an effective tool for teaching mathematics.

However, research on the use of the Matific platform in mathematics learning remains scattered, with varied focuses and contexts, and thus has not yet provided a comprehensive picture. (Ribeiro, 2025) in their research, even recommended the need for further studies that specifically analyse students' learning patterns when using Matific in order to determine whether its use should be expanded. This gap highlights the importance of a study capable of systematically summarising and synthesising existing findings.

Therefore, this study aims to analyse the use of the Matific platform in mathematics education through a Systematic Literature Review (SLR) approach combined with bibliometric analysis. This study was conducted to summarise research findings in order to provide an overview of the use of the Matific platform in mathematics learning. The results of this study are expected to serve as a reference in efforts to improve the quality of learning, in line with the strengthening of literacy and numeracy under the Merdeka Curriculum in Indonesia

## Research Methods

This study utilised the Systematic Literature Review (SLR) method with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

e-ISSN 2746-5594
p-ISSN 2746-5608

approach combined with Bibliometric Analysis. PRISMA is an internationally recognised framework for conducting comprehensive, transparent, and replicable systematic reviews that has been proven to improve the quality of reporting and confidence in research results (Page et al., 2021). Bibliometric analysis is used to map research developments and identify publication trends (José et al., 2019). There are four main stages in the PRISMA protocol, namely: identification, screening, eligibility, and inclusion (Page et al., 2021).

*Identification*

The search was conducted using the Publish or Perish (POP) platform connected to Google Scholar for the period 2020-2026. To maintain data manageability and search relevance, the maximum number of search results was limited to 500 articles. The keyword used was '*matific*'. Then, determining the research question was necessary to identify articles relevant to the research topic. There are five research questions established in this study to achieve the research objectives. These research questions are presented in Table 1.

Table 1. Research questions

| Indeks | Research Questions | Objectives |
|---|---|---|
| RQ1 | At what level of education is the Matific platform most widely researched in the context of mathematics learning? | Identify the level of education that is most often the focus of research related to the use of the Matific platform in mathematics learning. |
| RQ2 | From which countries has research related to the Matific platform been most widely studied in the context of mathematics learning? | Identify the distribution of countries of origin for research discussing the use of the Matific platform in the context of mathematics learning. |
| RQ3 | What are the findings of research related to the impact of using the Matific platform on student learning outcomes and/or understanding of mathematical concepts? | Assessing the impact of using the Matific platform on student learning outcomes and/or mathematical concept comprehension in the context of mathematics learning |
| RQ4 | What is the trend in research publications related to the use of the Matific platform in mathematics learning in 2020–2026? | To determine the number of studies discussing the use of the Matific platform in mathematics learning in the period 2016–2026. |
| RQ5 | What are the dominant keywords and themes in the relevant literature? | To determine the density of topics in research related to the use of the Matific platform in mathematics learning during the period 2016–2026. |

*Screening*

The screening process began with the removal of duplicates, resulting in 497 articles. Next, screening was conducted by reviewing the titles and abstracts to

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assess the suitability of the articles with the research focus, resulting in 38 articles that met the criteria for further review.

*Eligibility*

Eligibility was assessed by reading the full text. The evaluation results showed that 19 articles did not meet the inclusion criteria because they were Systematic Literature Review (SLR) articles and the full text was not accessible. Therefore, 19 articles were declared eligible for analysis in the next stage.

*Included*

At the final stage, 19 articles that met all inclusion criteria were included in the systematic review. These articles were then analysed in depth to answer the research objectives. The overall article selection process following the PRISMA protocol is illustrated in Figure 1.

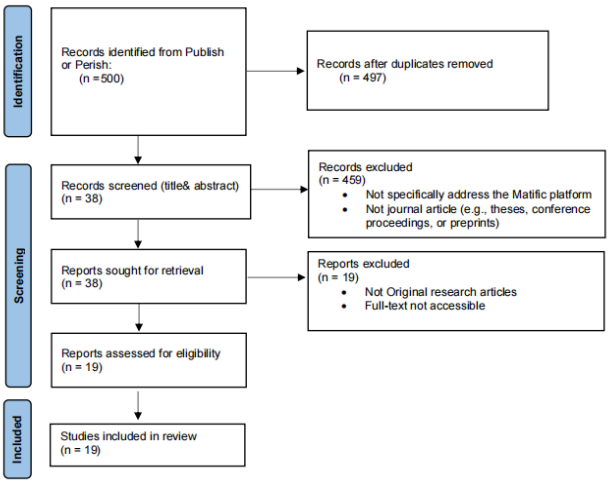


Figure 1. PRISMA flow diagram

## Results and Discussion

*Education Levels Using the Matific Platform*

The first research question is analysed in Figure 2.

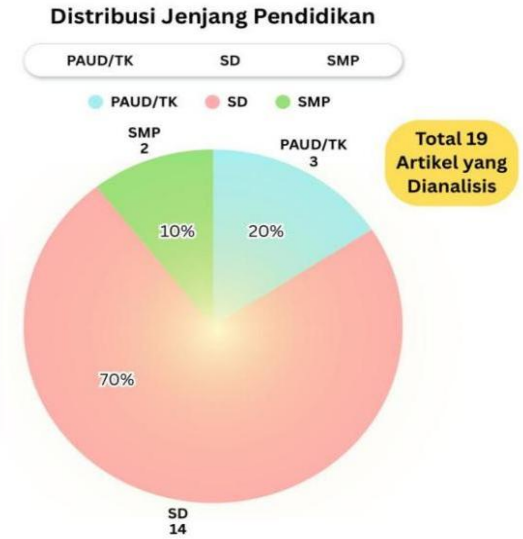


Figure 2. Education Level Distribution

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Figure 2 shows that, of the 19 articles reviewed, 14 (70%) focused reviewed, 14 articles (70%) focused on primary school level, 3 articles (20%) on early childhood education/kindergarten level, and 2 articles (10%) on junior high school level. This distribution indicates that the Matific platform is most widely researched and implemented at the primary education level. This finding is in line with the design characteristics of the Matific platform, which is designed with a game-based learning and gamification approach that is more suitable for primary school students (Portela et al., 2024).

Primary School Level (SD)

Research dominance at the primary school level shows that the Matific platform is in line with the characteristics of mathematics learning in primary schools. Table 2 below analyses 14 articles that examine the implementation of Matific in primary schools.

Table 2. Distribution of Articles in The Primary School Category

| Aspect | Representative Studies |
|---|---|
| Primary School Level (SD) | (Aparecida, 2025; Ayu, 2025; Barreto et al., 2026; Birbal et al., 2025; Felisberto, 2024; Melinda et al., 2026; Menezes et al., 2024; Muñoz et al., 2024; Özcan, 2026; Portela et al., 2024; Rahmadini, 2025; Ribeiro, 2025; Rizkawati et al., 2025; Rojas et al., 2026) |

Based on the results of the analysis in Table 2, the effectiveness of Matific at the primary school level shows significant improvements in various aspects of learning. (Rahmadini, 2025) reported an increase in mastery from 4.8% to 100% in problem-solving skills among fourth-grade primary school students when Problem-Based Learning (PBL) was integrated with Matific media. Research (Özcan, 2026) di in Turkey also explains that the use of Matific digital games significantly improves second-grade primary school students' conceptual understanding of multiplication, while also increasing student motivation and engagement in learning. These findings are consistent with the age of primary school students, who are in the concrete operational stage, which requires mathematics learning to emphasise the importance of interactive and contextual learning experiences in building mathematical understanding (Sampel, 2023).

However, other studies have also revealed several challenges and limitations that need attention. (Ribeiro, 2025) in his study of 78 students in São Paulo found contrasting results: 60% of students stated that they did not like using the Matific platform, with the main reasons being that they found it difficult to use, tiring (*cansativo*), boring (*enjoativa*), and uninteresting (*chata*). Although 51% of students believed that the platform could aid learning, this high level of resistance indicates problems in implementation or a mismatch between the content and students' expectations and learning styles. These contrasting findings reveal a crucial causal pattern: Matific's effectiveness at the primary school level is not determined by the platform itself, but by how it is embedded in classroom practice. When teachers use Matific as an integrated pedagogical tool aligned with lesson objectives, followed by discussion, and supported by adequate infrastructure outcomes are consistently positive. When the platform is imposed as a mandatory assessment tool without

e-ISSN 2746-5594
p-ISSN 2746-5608

preparation or meaningful integration, students perceive it as a burden rather than a learning experience, resulting in resistance. This cause-and-effect relationship explains why the same platform can produce mastery rates jumping from 4.8% to 100% in one study (Rahmadini, 2025) while generating 60% student dissatisfaction in another (Ribeiro, 2025) the variable is not Matific, but the quality of its pedagogical embedding.

Early Childhood Education/Kindergarten (PAUD/TK)

Although only 20% of the total articles reviewed, research on the use of Matific in PAUD/TK shows very promising results in improving the cognitive abilities of early childhood, particularly in the introduction of basic mathematical concepts. The following three articles reviewing the implementation of Matific in PAUD/TK are analysed in the table 3 below.

Table 3. Distribution of Articles in The Early Childhood Education/Kindergarten Category

| Aspect | Representative Studies |
|---|---|
| Early Childhood Education/Kindergarten (PAUD/TK) | (Abdul, 2024b; Hopiani et al., 2025; Ladat et al., 2025) |

Based on the results of the analysis in Table 3. the successful implementation of Matific at the early childhood education level can be explained by its alignment with theories of early childhood cognitive development. The platform is designed with the preoperational stage in mind, where children aged 2–7 years need visual experiences to understand abstract concepts. (Hopiani et al., 2025) explain that Matific provides visual representations that align with the way preoperational children think and facilitates learning through direct exploration. Additionally, (Abdul, 2024) emphasises that gamification in Matific is highly effective for preschool-aged children because it creates a fun learning environment, reduces early math anxiety, and increases engagement through rewards and positive feedback.

The implementation of Matific at the early childhood education level also demonstrates the importance of combining digital media with concrete activities and teacher guidance. The most effective learning occurs when Matific is combined with physical media such as dice, cards, and pictures, rather than being used exclusively (Hopiani et al., 2025). These findings are in line with the principle of developmentally appropriate practice, which emphasises the importance of a balance between teacher-guided learning and children's independent exploration (Coople, 2009).

These findings reveal a deeper causal logic that explains why Matific is effective at the early childhood level. Children in the preoperational stage (ages 2–7) learn primarily through sensory exploration and visual representation, not symbolic abstraction. Matific's animated, game-based interface provides exactly this kind of scaffolded visual experience, which explains why it reduces early math anxiety and increases engagement. Crucially, however, digital interaction alone is insufficient: the most effective implementations combined Matific with physical manipulatives such as dice, cards, and pictures (Hopiani et al., 2025). This is not a limitation of the platform but a confirmation of Bruner's enactive-iconic-symbolic

e-ISSN 2746-5594
p-ISSN 2746-5608

progression the concrete and pictorial phases must work together before children are ready for formal mathematical abstraction. Matific thus functions as the pictorial bridge between hands-on play and abstract mathematics, which is precisely why its impact at the PAUD/TK level is most powerful when it complements, rather than replaces, teacher-guided concrete activities.

Junior High School Education Level (SMP)

Research on the use of Matific at the junior high school level is the least common (10% of total articles), but it provides important insights into the effectiveness and challenges of implementing this platform for older students. The following table 4 analyses two articles that examine the implementation of Matific in junior high schools.

Table 4. Distribution of Articles in The Junior High School Category

| Aspect | Representative Studies |
|---|---|
| Junior High School Education Level (SMP) | (Romita et al., 2024; Vanderlei, 2024) |

Based on the results of the analysis in Table 4, (Romita et al., 2024) reported that Matific was highly effective in improving the mathematics learning outcomes of Year 7 students in the subject of integers, with an average effectiveness of 88.45% based on student questionnaires. Of the 29 students who participated, 59.9% responded very positively and 34.2% responded positively to the use of the Matific platform. In a study conducted by (Vanderlei, 2024), it was stated that lessons using the Matific platform challenged students, thereby helping to increase their interest and engagement in completing their learning.

These findings indicate that gamification is still relevant and effective for secondary school students, even though they are at a higher stage of cognitive development than primary school or early childhood education students. However, this finding should be interpreted cautiously the limited number of SMP studies (only 10% of the total) means that conclusions about this level remain preliminary. What the data does suggest is a pattern worth investigating further at the junior high school level, the motivational pull of gamification may be more important as a re-engagement strategy for students who have already developed negative attitudes toward mathematics, rather than as a primary instructional medium. Future research should examine whether Matific's effectiveness at this level increases when its content is perceived as appropriately challenging rather than too simple for older learners.

*Geographical Distribution of Research Related to the Matific Platform*

The second research question is analysed in Figure 3.

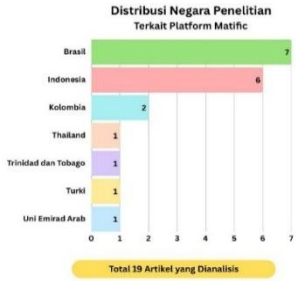


Figure 3. Geographical Distribution

e-ISSN 2746-5594
p-ISSN 2746-5608

An analysis of Figure 3, based on the 19 articles reviewed shows that the geographical distribution of research on the Matific platform is concentrated in certain countries. Brazil dominates with 7 articles (36.84%), followed by Indonesia with 6 articles (31.58%). This phenomenon is in line with the trend in developing countries that are undergoing digital transformation in their education systems (Trucano, 2016). Both countries face similar challenges in mathematics education, including low student mathematics literacy in international assessments such as PISA (Programme for International Student Assessment), which encourages the search for innovative solutions through digital learning platforms (OECD, 2023).

Research on the Matific Platform in Brazil

The research context in Brazil is very diverse, covering various levels of education from early childhood education (*educação infantil*) to secondary school (*ensino médio*), with a primary focus on the early years of primary education (*ensino fundamental anos iniciais*). Interestingly, most Brazilian research is conducted using a qualitative approach with the experience report methodology, which provides deep insights into the implementation of Matific in the context of real classrooms (Aparecida, 2025). Table 5 below analyses seven articles discussing the implementation of Matific in Brazil.

Table 5. Distribution of Articles in Brazil Category

| Aspect | Representative Studies |
|---|---|
| Brazil | (Aparecida, 2025; Barreto et al., 2026; Felisberto, 2024; Menezes et al., 2024; Portela et al., 2024; Ribeiro, 2025; Vanderlei, 2024) |

Based on the results of the analysis in Table 5, (Barreto et al., 2026) stated that the implementation of Matific in schools in the State of São Paulo successfully enabled more students to achieve proficiency levels, increasing from around 24% to 48% in one year. However, research in Brazil also revealed the complexity of large-scale implementation. (Ribeiro, 2025) found that when Matific was integrated as a mandatory assessment component without adequate preparation, 60% of students reported disliking the platform because it was perceived as a burden rather than a learning tool. These contradictory findings highlight the importance of not only providing technology, but also ensuring supporting infrastructure that includes teacher training, adequate technological infrastructure, and meaningful pedagogical integration (Peggy et al., 2007)

Research on the Matific Platform in Indonesia

Indonesia ranks second with six articles (31.58%), reflecting the development of mathematics learning technology in the context of national education. The unique characteristic of Indonesian research lies in its focus on integrating Matific with a learning model approach that is in line with the national curriculum. Table 6 below analyses six articles that examine the implementation of Matific in Indonesia.

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Table 6. Distribution of Articles in Indonesia Category

| Aspect | Representative Studies |
|---|---|
| Indonesia | (Ayu, 2025; Hopiani et al., 2025; Melinda et al., 2026; Rahmadini, 2025; Rizkawati et al., 2025; Romita et al., 2024) |

Based on the results of the analysis in Table 6, (Rahmadini, 2025) demonstrates the remarkable effectiveness of combining Problem-Based Learning (PBL) with Matific, showing how digital platforms can reinforce pedagogical approaches rather than replace them, in line with the principles of Technological Pedagogical Content Knowledge (TPACK), which emphasises the complex interaction between technology, pedagogy, and content.

A significant contribution of Indonesian research also lies in its focus on students with special needs (ABK), particularly students with autism spectrum disorders. (Ayu, 2025) reported that the Matific application had a significant effect on improving the mathematics learning outcomes of autistic students in addition lessons, with all participants experiencing an increase in scores from a pretest average of 75 to a posttest average of 98.75. This finding is particularly important as it explores the potential of Matific in the context of inclusive education, where the platform's visual features, gamification, and immediate feedback are well-suited to the visual and concrete thinking styles of autistic children. This research demonstrates how technology can serve as a bridge to more equitable and dignified learning for all students.

However, as in Brazil, the Indonesian study also identified significant implementation challenges, particularly related to the digital infrastructure gap between urban and rural areas, limited devices in schools, and the need for in-depth teacher training on pedagogical integration of technology.

Research on the Matific Platform in Other Countries

Other countries represented in the study include Colombia (2 articles), Thailand, Trinidad and Tobago, Turkey, and the United Arab Emirates (1 article each). Although limited in number, they provide valuable perspectives on the Matific platform in mathematics learning in diverse sociocultural contexts. The following articles examine the implementation of Matific in Indonesia and other countries, as analysed in the table 7 below.

Table 7. Distribution of Articles in Other Countries Category

| Aspect | Representative Studies |
|---|---|
| Kolombia, Thailand, Trinidad and Tobago, Turki, and Uni Emirat Arab | (Abdul, 2024; Birbal et al., 2025; Ladat et al., 2025; Muñoz a et al., 2024; Özcan, 2026; Rojass et al., 2026) |

Based on the results of the analysis in Table 7, research from Colombia by (Muñoz et al., 2024; Rojas et al., 2026) focuses on the context of rural education and the transformation of teacher practices. It shows how mediation by Matific, when combined with mentoring, can support the understanding of fractions, which is one of the most challenging topics in primary school mathematics. Thus, the findings

e-ISSN 2746-5594
p-ISSN 2746-5608

confirm that technology is not a standalone solution but must be integrated into learning with supportive pedagogical mentoring.

(Abdul, 2024) from the United Arab Emirates reported a significant improvement in preschool students' learning and found no gender differences in achievement. Meanwhile, (Birbal et al., 2025) from Trinidad and Tobago presented different findings. where, although they did not find a significant improvement in short-term mathematics learning, they found a strong positive impact on male students' attitudes and motivation towards mathematics. These findings are important because they remind us that the impact of educational technology is not always immediately apparent in achievement tests, but in changes in affective dispositions that contribute to long-term learning success.

*The Impact of Using the Matific Platform in Mathematics Learning*

The third research question is analysed in Figure 4.


Figure 4. The Impact Distribution

An analysis of Figure 4, all articles (19 articles, 100%) reported a positive impact on student motivation and engagement, indicating that this is the most consistent impact of Matific implementation. The impact on learning outcomes was reported in 17 articles (89.47%), showing that improved academic achievement is a very common outcome but not entirely universal. A total of 11 articles (57.89%) explicitly examined the impact on mathematical concept understanding, indicating that although conceptual understanding is important, not all studies specifically measured this dimension as a variable. Meanwhile, 7 articles (36.84%) reported conditional impacts, where the effectiveness of Matific depended on certain conditions or factors such as teacher quality, technological infrastructure, or integration with specific learning approaches.

Impact on Student Motivation and Engagement

The most consistent finding across all studies reviewed was the positive impact of Matific on student motivation and engagement in mathematics learning, as reported by 100% of articles (19 articles). (Romita et al., 2024) reported that 86.2% of secondary school students enjoyed Matific and 72.4% preferred it to conventional methods, with 65.5% of students stating that the platform increased their motivation to learn. Similar findings were reported by (Vanderlei Schroeder &

e-ISSN 2746-5594
p-ISSN 2746-5608

Rosicacia Florêncio Costa, 2024), who found that students described learning with Matific as 'fun' and felt challenged by both the platform and their peers. The following articles on the implementation of Matific that impact student motivation and engagement are analysed in the table 8 below.

Table 8. Distribution of Articles in Motivation and Engagement Category

| Aspect | Representative Studies |
|---|---|
| Motivation and Engagement | (Abdul, 2024; Aparecida, 2025; Ayu, 2025; Barreto et al., 2026; Birbal et al., 2025; Felisberto, 2024; Hopiani et al., 2025; Ladat et al., 2025; Melinda et al., 2026; Menezes et al., 2024; Muñoz et al., 2024; Özcan, 2026; Portela et al., 2024; Rahmadini, 2025; Ribeiro, 2025; Rizkawati et al., 2025; Rojas et al., 2026; Romita et al., 2024, 2024; Vanderlei, 2024) |

Based on the results of the analysis in Table 8, the effect of Matific on student motivation and engagement can be understood through the principles of gamification explained by (Hamari et al., 2014), such as tiered challenges, reward systems, and direct feedback, which have been proven to increase intrinsic motivation by creating a flow experience. (Portela et al., 2024) also stated that Matific significantly increases students' curiosity about mathematics, commitment, and initiative, which are indicators of intrinsic motivation. Furthermore, the reduction of math anxiety also contributes to increased engagement.

Impact on Learning Outcomes

A positive impact on learning outcomes was reported in 17 of the 19 articles (89.47%), making it the second most consistent outcome after motivation and engagement. The following articles on the implementation of Matific and its impact on student learning outcomes are analysed in the table 9 below.

Table 9. Distribution of Articles in Learning Outcomes Category

| Aspect | Representative Studies |
|---|---|
| Learning Outcomes | (Abdul, 2024; Aparecida, 2025; Ayu, 2025; Barreto et al., 2026; Felisberto, 2024; Melinda et al., 2026; Menezes et al., 2024; Muñoz et al., 2024; Özcan, 2026; Portela et al., 2024; Rahmadini, 2025; Ribeiro, 2025; Rizkawati et al., 2025; Rojas et al., 2026; Romita et al., 2024a; Vanderlei Costa, 2024) |

Based on the results of the analysis in Table 9, evidence of improved learning outcomes is strong and comes from various contexts, such as education levels and research designs. (Rahmadini, 2025) describe an increase in completion rates from 4.8% to 100% with an average increase in scores from 38.6 to 92.4 (cycle II) in the problem-solving skills of fourth-grade primary school students. (Ayu, 2025) found a significant increase from a pretest average of 75 to a posttest average of 98.75 in autistic students, with all participants experiencing an increase in scores. However, not all articles found a significant impact on learning outcomes. This is because

e-ISSN 2746-5594
p-ISSN 2746-5608

academic improvement is not immediately apparent even though student motivation has increased.

Impact on Mathematical Conceptual Understanding

A total of 11 articles (57.89%) specifically discussed the impact of Matific on mathematical conceptual understanding from learning outcomes or tests. The following articles discuss the implementation of Matific and its impact on students' mathematical conceptual understanding, as analysed in the table 10 below.

Table 10. Distribution of Articles in Conceptual Understanding Category

| Aspect | Representative Studies |
|---|---|
| Conceptual Understanding | (Ayu, 2025; Birbal et al., 2025; Felisberto, 2024; Hopiani et al., 2025; Ladat et al., 2025; Melinda et al., 2026; Menezes et al., 2024; Muñoz et al., 2024; Portela et al., 2024; Rahmadini, 2025; Vanderlei, 2024) |

Based on the results of the analysis in Table 10, in mathematics education, there is a fundamental difference between procedural knowledge (the ability to perform mathematical operations) and conceptual understanding (comprehension of underlying principles and relationships) (Rittle, 2014). (Hopiani et al., 2025) also found that young children can not only name geometric shapes, but also distinguish shapes based on their properties, find shapes in their surroundings, and arrange geometric patterns, which indicates an understanding that goes beyond rote memorisation to relational understanding. Furthermore, (Ladat et al., 2025) found that kindergarten children can not only read and count numbers 1-5, but are also able to use Hindu-Arabic numerals to indicate quantities and count and name the number of objects, demonstrating an understanding of number concepts and one-to-one correspondence. These findings show that Matific not only helps students perform mathematical operations, but also strengthens their understanding of mathematical concepts more comprehensively.

*Distribution of Research Publications on the Use of the Matific Platform in Mathematics Education*

The fourth research question is analysed in Figure 5.


Figure 5. Publication Trends

e-ISSN 2746-5594
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An analysis of Figure 5, a bibliometric analysis of 19 articles that met the inclusion criteria showed a trend in the publication of Matific platform research in the 2020-2026 period, which was dominated by the latter years. Of the entire six-year period studied, no articles met the inclusion criteria for the 2020-2023 period, while all 19 articles were distributed in the 2024-2026 period with the following pattern: 7 articles in 2024, increasing to 8 articles in 2025, which was the peak of productivity, then to 4 articles in 2026. The absence of publications that met the criteria in the 2020-2023 period does not necessarily indicate that no research on Matific was conducted during that period, but rather reflects several possibilities: (1) existing research has not been published in academic journals or repositories indexed in the databases used in this systematic review; (2) existing publications did not meet the methodological inclusion criteria set, such as not focusing on mathematics education, not reporting empirical impacts, or not having adequate methodological quality; or (3) implementation. The increase in publications from 7 articles in 2024 to 8 articles in 2025 reflects research interest driven by several factors: the large-scale implementation of Matific in Brazilian (*São Paulo, Paraná*) and Indonesian public school networks during the 2023–2024 period, which created opportunities for large-scale empirical research (Barreto et al., 2026; Felisberto, 2024), increased accessibility to technological infrastructure after the COVID-19 pandemic, which accelerated digital transformation in education and made digital learning platforms more relevant for research, and research on the effectiveness of game-based learning, which encouraged more researchers to explore specific platforms such as Matific.

The decline in publications in 2026 to 4 articles, a 50% decrease from the peak in 2025, needs to be interpreted with great caution given that 2026 is still ongoing at the time of this systematic review data collection, as the academic publication process typically has a significant lag time between submission, peer review, and final publication, which can reach 6-18 months (Huisman & Smits, 2017). Thus, the number of publications in 2026 will continue to increase over time and has the potential to match or even exceed that of 2025.

Density of Subtopics in Research on the Use of the Matific Platform in Mathematics Education

The fifth research question is analysed in Figure 6.

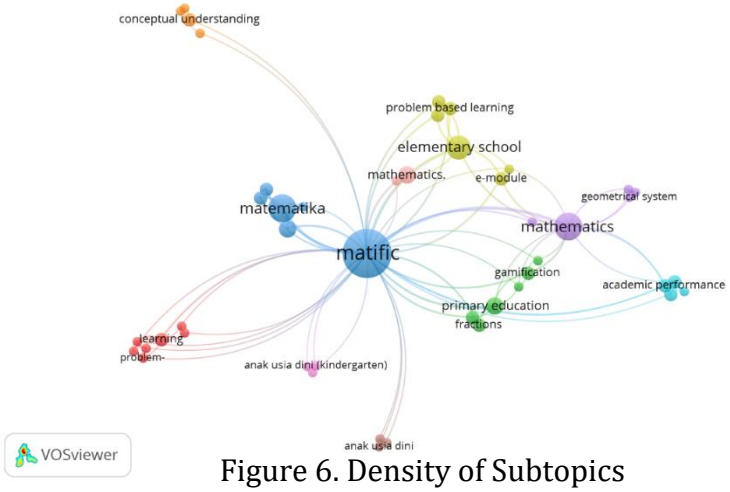


Figure 6. Density of Subtopics

e-ISSN 2746-5594
p-ISSN 2746-5608

An analysis of Figure 6, co-occurrence network analysis using VOSviewer on 19 articles identified six thematic clusters representing the research landscape of the Matific platform, with "matific" as the central node connecting the entire network. The first cluster (light blue/cyan) focuses on language and learning contexts with the keywords "mathematics" and "academic performance", reflecting research conducted in non-Anglophone contexts, particularly Brazil and Indonesia, which dominate 68.42% of publications. The second cluster (light green/lime) represents levels and pedagogical approaches with the keywords "problem-based learning", 'elementary school', "mathematics", "e-module", "gamification", "primary education", and "fractions", indicating a strong focus on the integration of Matific with constructivist learning models at the primary education level, consistent with the findings that 70% of articles focused on primary schools and 57.89% examined conceptual understanding through a problem-solving approach. The third cluster (purple) with the keywords "mathematics" and "geometrical system" indicates a specific sub-field that explores geometry learning, in line with several studies such as (Hopiani et al., 2025; Muñoz Valencia et al., 2024). The fourth cluster (pink) includes "early childhood" and "early childhood (kindergarten)", reflecting 20% of articles focusing on early childhood education. The fifth cluster (orange) with the keyword "conceptual understanding" represents a focus on conceptual understanding outcomes that differ from procedural learning outcomes. The sixth cluster (red) with the keywords "learning" and "problem" indicates an emphasis on the learning process and problem solving as core competencies developed through Matific.

Thus, research on the use of Matific should not only focus on the effectiveness of learning outcomes, but also look at how this platform is applied in learning practices. This includes how teacher training can help optimise the use of Matific, factors that support or hinder its integration in various learning contexts, and how this platform can be adapted to serve the diverse needs of students, including those with special needs. In addition, studies on the benefits and costs of using Matific on a broader scale also need to be considered so that its implementation can have a sustainable impact. The bibliometric clustering itself tells a broader story: the fact that "gamification" and "problem-based learning" appear in the same cluster as "Matific" is not accidental. It reflects a field that has already moved beyond asking "does Matific work?" toward asking "under what pedagogical conditions does Matific work best?" This is a sign of a maturing research field one that increasingly understands that digital platforms are not magic solutions but pedagogical instruments whose effectiveness is entirely contingent on the hands that use them and the instructional context in which they are embedded. The six thematic clusters identified through VOSviewer thus serve as a research roadmap: each cluster represents an unanswered question about the conditions, populations, and content areas where Matific's potential has yet to be fully mapped.

## Conclusion and Suggestion

This systematic literature review and bibliometric analysis of 19 studies published in 2024–2026 reveals that the Matific platform is most widely researched at the primary school level, with Brazil and Indonesia as the leading contributors. Across all five research questions, three overarching findings emerge: (1) Matific

e-ISSN 2746-5594
p-ISSN 2746-5608

consistently improves student motivation and engagement regardless of context; (2) improvements in learning outcomes are substantial but context-dependent; and (3) the effectiveness of the platform is ultimately determined not by the technology itself, but by the quality of pedagogical integration and teacher readiness. Future research should prioritise controlled experimental designs, longitudinal studies, and systematic investigation of teacher training models particularly in regions with limited digital infrastructure.

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