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Analysis of Electronic Modules in Enhancing Mathematics Learning Motivation in Elementary Schools

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Abstract
The purpose of this study was to analyze the use of electronic modules in improving learning motivation in mathematics subjects in elementary schools. The method used is qualitative with a bibliometric analysis approach. Documents collected from the Publish or Perish (PoP) application using the Google Scholar database are then combined into one file in RIS format and entered into the VOSviewer application. The initial number of articles retrieved was 1000 and then narrowed down to 100 articles for analysis. Data analysis is the search stage, filtering stage, and bibliometric analysis stage. The results of the study showed that the year of publication that published the most articles and journals was 2023 with a total of 59 publications, then when viewed from the publishing institution, Ganesha University of Education has the highest number of documents, namely 6 documents and 106 citations. Meanwhile, when viewed from the publisher who published, the Scientific Journal of Education and Learning has the most document publications along with the number of citations. When viewed from the author, Yunita Lastri received 87 citations, making it the highest among other publications. When viewed from the keywords, "Electronic Module (E-module)" recorded 81 occurrences, while the keyword "Electronic Module in Improving Learning Motivation," which recorded 16 occurrences. Through bibliometric analysis, it was found that there is a positive trend in publications related to e-modules, indicating increasing attention to the implementation of technology in education. E-modules not only provide interactive and interesting learning materials, but can also meet the diverse needs of students, thus encouraging their involvement in the learning process.

Keywords: *electronic module, learning motivation, bibliometrics, elementary school*

Introduction

The rapid development of science and information technology provides ease in communicating. The progress of science and information technology also has a very positive impact on education (Hasanah et al., 2022; Huraerah et al., 2024). Education that is integrated with technology can make learning interesting. This is because learning that combines elements of technology can involve students' activeness in learning and can explore their potential (Supriana et al., 2023; Wahid et al., 2021). In the process of

elementary school education, it is the initial level obtained by students when taking formal basic educationand at this level, the main subject of importance is mathematics, which requires a sophisticated understanding of logic and excellent organisational skills.

Mathematics is everywhere and is the foundation for the advancement of modern technology (Ningsih & Shanie, 2023). Understanding mathematics plays an important role both in everyday life and in facing technological advances. Given how crucial the role of mathematics is in this context, students need to master mathematics learning in depth.

In reality, mathematics skills among Indonesian students are still considered inadequate (L. R. Sari et al., 2024). Based on the results of the Trend International Mathematics and Science Study (TIMSS) research in 2015, which stated that the mathematics skills of Indonesian students only obtained 397 points, below the TIMSS Scale Centerpoint standard, which is 500 points (Mutakin et al., 2023). In addition, based on the results of the Trends in International Mathematics and Science Study (TIMSS) in 2015 according to Gusmayenti, (2021) Indonesia was ranked 44 out of 49 countries while in 2019 based on TIMSS 2019 Participants (2009) Indonesia did not participate.

Mathematics is still considered a scary subject by students (Amir et al., 2024; R. N. Hakim, 2021; Ismiati, 2023). In fact, mathematics itself has an important role in life. In addition to the relationship between mathematics and formulas and numbers that are considered difficult, it is also due to the selection of monotonous and uninteresting learning media so that mathematics is still viewed negatively by students (Hamimah & Andriani, 2023; Purba & Mm, 2024). Students stated that they felt lazy every time they studied mathematics. This is due to the way teachers teach which still uses conventional media (Aien et al., 2025). This assumption has an impact on decreasing student motivation in the learning process. In fact, motivation is an important part of learning activities (Hafsah et al., 2025; Salimah et al., 2024; Ermono et al., 2025). Students will be enthusiastic and feel motivated if there is something interesting in every learning activity (Insani et al., 2023; Suharni, 2021). If the decline in motivation continues to occur in students, it will affect learning outcomes. Therefore, motivation plays an important role in improving students' mathematics learning outcomes. Research results Nurrawi et al., (2023) the learning motivation that students receive from both external and internal factors will greatly affect the process and results of learning mathematics. Motivation needs to be considered properly to improve student learning outcomes.

In addition, the limited information about technology, which only focuses on the usual way of teaching, requires a solution to create a pleasant learning atmosphere. The selection of effective learning media is also something that must be considered in order to overcome problems in learning. In designing a learning process to be more interesting, it can be done in various ways, one of which is by using media in learning activities (Perayani & Rasna, 2022). Media can be used by teachers to support learning both effectively and efficiently (Fitriani et al., 2021; Taufik & Doyan, 2022). In addition to being a learning tool, media can also function as a tool in building good communication with students (Nurhasana, 2021; Situmorang, 2023). Aside from being a learning tool, media can also serve as a tool in building good communication with students. Good communication between students is essential as it can enhance understanding and collaboration in the learning process, allowing them to share ideas, perspectives and experiences. By creating an open communication environment, students feel more comfortable to actively participate, which in turn enriches their learning experience and helps build positive social relationships.

The use of technology in elementary school education will have a positive impact as a means of disseminating information or knowledge to students (A. N. Hakim & Yulia, 2024; Jamun et al., 2023). In addition, the use of media in the learning process can also establish good relationships between teachers and students (Al Mawaddah et al., 2021; Argaruri et al., 2023; Pontjowulan, 2023). One of the media that can be used by teachers is modules. Along with the development of science and technology, modules have been further developed in the form of electronic modules (E-Modules).

E-module is one of the digital teaching materials consisting of animation, sound, text or images containing electronic material (Anshari et al., 2024; Azizah & Rachmadiarti, 2023; Mella et al., 2022; Pratiwi et al., 2024). E-modules are designed as attractively as possible and accompanied by simulations so that they can be used by students in learning. Sholikhah & Anissaturrofiqah, (2024) said E-modules are educational resources or tools that are built methodically and attractively to facilitate learning. E-modules are portable and versatile, making them convenient to transport and resistant to damage. This is in line with Firdausia, (2024) the fact that E-modules provide many benefits, including practicality and flexibility, durability, portability, and cost-effectiveness. The meaning of E-module based on the view Firdausia et al., (2024)

refers to a module that operates on an electronic device, presenting images, graphics, text, and videos to students to help assess and track student learning progress and skills.

According to the opinion Miranti et al., (2024); Nugraha et al., (2023); Padwa & Erdi, (2021)of learning through e-modules is more effective and easier for students to understand. For that, the use of e-modules can be used to increase student motivation because the presentation of the material is more interactive and dynamic (Cahyadi et al., 2025; Lastri, 2023). E-modules can also be developed using a different approach as a source of interactive learning for students (Amelia et al., 2024; Muhaimin et al., 2023; Permatasari et al., 2021).

There are previous studies related to this research, namely (Sitorus & Rizkia, 2025) based on the trend of digital media articles and analysed has a percentage when COVID-19 has a percentage of 29% with trends found around 59 related articles. Meanwhile, after COVID-19 has a percentage of 71% with trends found around 141 related articles. It can be seen that after COVID-19 digital media continues to be used and is even growing and increasing. Digital media and digital teaching materials that are most frequently used during COVID19 and are increasing and developing after COVID-19 are interactive video digital media and e-book digital teaching materials. Then the research (Arifiani & Rahmawan, 2025) reviewed 10 journal articles related to the results of the use of PBL learning models in class XI IPA students on learning motivation, from the results of the study it can be concluded that the PBL learning model proved effective in increasing student learning motivation in chemistry subjects. From 10 articles, the results showed that the application of the PBL model can increase student motivation and learning outcomes.

Further research (Sudarsono & Burhanuddin, 2024) in this study, 141 research data obtained from the VOS viewer database were used. From the results of co-authorship analysis, it can be seen that the cooperation between clusters formed by researchers working on mobile learning is weak. In addition, the number of active researchers is low in most of them and the detected country clusters are not more than 3. There is a need for continuing research related to the development of local wisdom-based learning strategies, considering that learning activities need to consider the character of students and the value of surrounding local culture. Research (Darmayanti & Amalia, 2024) the data used in this study came from 75 most relevant articles obtained through various stages of analysis and data extraction using Covindence software. Based

on the research that has been conducted, it is found that research in the field of using digital teaching materials in science learning in elementary schools is fluctuating. The impact of using digital teaching materials in science learning in primary schools includes increasing social sensitivity, critical thinking skills, 21st century skills, learning outcomes, and student character.

The difference with the research conducted is that bibliometric analysis research seeks to explore trends and frequency of publications related to electronic modules, other studies are more empirical and discuss the specific development of modules or learning media. While the similarity of the research is that it focuses on increasing students' learning motivation through the use of electronic-based learning materials, this shows that interactive modules or media that are in accordance with students' needs can contribute positively to mathematics learning. Previous studies agree that the use of technology, such as electronic modules, has the potential to encourage student engagement and achieve learning goals.

This study focuses on electronic modules in mathematics learning, while previous studies, such as those conducted by (Sitorus & Rizkia, 2025) and (Darmayanti & Amalia, 2024), have mostly highlighted the use of digital media in general in science learning. In addition, this study explores the analysis of student learning motivation in the context of using electronic modules, which has not been widely researched, although (Arifiani & Rahmawan, 2025) discussed PBL and motivation. The bibliometric methodology used is also specific to evaluating trends and patterns in the use of electronic modules, providing new insights into the development of this topic. Previous research has not touched on specific aspects of e-modules in the context of learning mathematics, as well as the long-term impact of using such modules on student motivation and learning outcomes. In addition, this research will consider cultural values and student character in module development, which has also not been widely researched. Therefore, the purpose of this study is to analyze the use of e-modules in increasing learning motivation in mathematics subjects in elementary schools.

Method

This research method uses descriptive qualitative with a bibliometric analysis approach. Bibliometric analysis is a quantitative method for analyzing bibliographic data in articles or journals (Effendy et al., 2021; Rohmayanti et al., 2023). This analysis is

used to investigate references to scientific articles cited in a journal, mapping the scientific field of a journal, and to group scientific articles that are in accordance with a field of research. The indicators of this research are the number of publications, the number of citations from institutions or universities, the number of citations from journals, the number of citations from documents, and occurrences with keywords. This research was conducted by online search. Data collection using PoP (Publish or Perish) software and VOS viewer. The data collected are in the form of articles, journals, and proceedings. Data analysis consists of four steps, namely the search stage (bibliographic search is limited to several aspects, namely (1) the type of bibliography used in the type of journal article, title, abstract, and keywords. Journal sources taken with criteria from accredited or reputable journals, namely Sinta 1 to Sinta 6; (2) the keywords used are "electronic modules in increasing learning motivation" (3) restrictions are made on the search for 2023-2025 with a total of 100 documents because that year had the most document results than other years. Filtering stage selection to select journals to be analyzed. The bibliography selected and used is the type of article title, abstract, keywords, articles or reviews. Initial data search through the publish or perish (PoP) application. Bibliometric analysis stage (data analysis is carried out by looking at the ocurrent pattern produced according to the cluster color generated by VOSviewer, then associations are made between words connected to each cluster). The research flow is explained in Figure 1.

Figure 1 Bibliometric Research Flow

The figure above illustrates the data analysis process which consists of several stages, namely Keyword Research, the researcher conducts keyword research to identify terms and phrases that are relevant to the topic under study. This process ensures that the search for information covers relevant sources. Next, at the Initial Search Reduction stage, researchers conducted an initial search using the predetermined keywords, then filtered and eliminated irrelevant information to obtain a more focused data set. Then, at the Reduction in Total Initial Search stage, the researcher conducted a further reduction of the total initial search results, ensuring only high-quality sources were included in the analysis. After that, the researcher compiles the relevant data into an Initial Statistical Image Compilation, which involves creating graphs or tables to provide a visual representation of the data that has been collected. At the Data Interpretation in Analytical Narrative stage, the researcher interprets the data in the form of an analytical narrative, explaining the findings, analysing the results, and providing context for the data that has been presented. This process emphasises the importance of systematic filtering and analysis in research to produce valid and useful data.

Results and Discussion

Literature is obtained from journal publications, articles, and proceedings in the period 2023-2025 in the PoP database with a maximum result of 100 documents. Table 1. Describes the year, number and percentage of publications with the keyword "electronic modules in increasing learning motivation". Table 2. Describes the institutions with the largest number of documents. Table 3. Describes the publishers with the largest number of documents. Table 4. Publications with the largest number of citations. Table 5. Keywords related to "electronic modules in increasing learning motivation".

Table 1 Number and Percentage of Publications (2023-2025)

No	Publication Year	Number of Publications	Percentage (%)
1	2025	6	6%
2	2024	35	35%
3	2023	59	59%
	Total	100	100%

Source: Harzing's Publish or Perish

In recent years, there has been a decline in publications related to studies or research as shown in the table that presents the number and percentage of publications from 2023 to 2025. In 2023, there were 59 publications, which accounted for 59% of the

total, while in 2024 the number decreased to 35 publications (35%), and only 6 publications (6%) are expected in 2025. This decline could be due to several factors, including saturation in certain research topics, where many studies have already been conducted and published, reducing the number of relevant new studies. Changes in research focus among academics and researchers may shift attention from previously popular topics to other areas that are considered more important or relevant. Challenges in research funding and limited resources may limit researchers' ability to conduct new studies. In addition, global conditions, such as the impact of the COVID-19 pandemic, affect research and publication priorities, with researchers preferring to focus on emerging urgent issues.

Table 2 Institutions with the Largest Number of Documents

No	Name of Institution	Documents	Quotes
1	Ganesha University of Education	6	102
2	Tuanku Tambusai Heroes University	4	6
3	University of Mataram	3	11
4	Bima Student Park Teacher Training College	3	7
5	PGRI University of Semarang	3	4
6	University of Pasundan	3	1
7	Citra Bakti Teachers' Training College	2	93
8	National Institute of Technology Malang	2	57
9	Surabaya State University	2	4
10	Malang State University	2	1

Source: Harzing's Publish or Perish

In the table showing the institutions with the highest number of documents, it can be seen that some institutions published many documents, while others only a few. There are several factors that influence this difference, with the amount of resources available at each institution playing an important role. Institutions that have more funding and research facilities tend to be able to support more research projects, resulting in more publications. For example, Ganesha University of Education's 102 papers clearly indicate strong resource support for research. The focus and prioritisation of research at individual institutions may differ. Institutions that have strong study programmes or research centres in specific areas, such as education or technology, will be more active in generating publications. For example, institutions that focus on teacher training, such as PGRI University of Semarang and Citra Bakti Teachers' Training College, may have more research related to curriculum and teaching methodology. The

culture and publication policies within the institution also play a role. Institutions that encourage lecturers and researchers to publish their work through incentives or award programmes tend to have a higher number of publications. In contrast, institutions that do not have this encouragement have difficulty in increasing the number of publications. Collaboration between researchers and institutions can also affect the number of publications. Institutions that are active in collaboration with other institutions or that have extensive research networks tend to produce more documents. This is evident in some institutions that have collaborations with international or national institutions that support research.

Table 3 Journals with the Largest Number of Documents

No	Journal Name	Documents	Quotes	Accreditation
1	Scientific Journal of Education and Learning	4	81	Sinta 3
2	Scientific Journal of Mathematics Education	2	1	Sinta 3
3	Indonesian Research Journal on Education	2	0	Sinta 5
4	Pendas: Scientific Journal of Elementary Education	3	1	Sinta 4
5	Journal of Mathematics and Natural Sciences Education	3	7	Sinta 2

Source: Harzing's Publish or Perish

In this table, five journals stand out, each with a different number of documents and accreditations, reflecting the popularity and quality of the journal. Scientific Journal of Education and Learning comes out on top with 4 documents and 81 citations, indicating that the journal is not only prolific in terms of publications, but also has an impact within the academic community. This high citation rate indicates that the research published in this journal is widely referenced by other researchers, reflecting its relevance and strong contribution to knowledge in the field of education. Scientific Journal of Mathematics Education also performed well with 4 documents and 21 citations. This journal focuses on mathematics education, which is an important area in curriculum development and teaching methods. The increasing interest in mathematics education often relates to the need to improve numerical skills among students. Indonesian Research Journal on Education and Pendas: Scientific Journal of Elementary Education, each with 3 documents and varying numbers of citations, demonstrate the diversity in topics that can be explored in an educational context. These journals play a role in publicising research that is relevant to the local context and challenges facing the

education system in Indonesia. The Journal of Mathematics and Natural Sciences Education recorded 3 documents with 7 citations, suggesting that while not as prolific as other journals, it still has valuable contributions in more specific areas. The varying accreditation of the journals, as seen in the table, also gives an idea of the quality and recognition of the journals among academics. Journals with higher accreditation tend to attract more authors and readers, which in turn can affect the number of publications and citations.

Table 4 Publications with the Highest Number of Citations

No	Author Name	Document Title	Year	Journal Name	Quotes
1	Yunita Lastri	Development and Utilization of E-Module Teaching Materials in the Learning Process	2023	Journal of Education Image	87
2	Yuyun Asnawati and Sutiah	Development of Animated Video Media Based on Canva Application to Increase Student Learning Motivation	2023	Journal of Islamic Education	64
3	Maulidah Hasanah, Supeno, and Diah Wahyuni	Development of E-Modules Based on Flip Pdf Professional to Improve Students' Creative Thinking Skills in Science Learning	2023	Tarbiyah Wa'talim Journal of Educational Research and Learning	44
4	Ainil Fitri, Liza Efriyanti, Rifka Silmi	Development of Digital Informatics Teaching Modules for Computer Networks and the Internet Using Canva at Sman 1 Harau	2023	Journal of Informatics Engineering Students	42
5	Putu Lusi Antari, I Wayan Widiana, and I Made Citra Wibawa	Electronic Module Based on Project Based Learning for Science Learning to Improve Elementary School Students' Learning Outcomes	2023	Scientific Journal of Education and Learning	39

Source: Harzing's Publish or Perish

Table 4 shows the publications with the highest number of citations, reflecting the impact and relevance of the research in the field of education, particularly regarding the use of electronic modules. In this context, the number of citations can be an

important indicator of the quality and influence of scientific work among researchers and practitioners. The first publication by Yunita Lastri titled 'Development and Utilization of E-Module Teaching Materials' in 2023 recorded 87 citations, indicating strong acceptance from the academic community. This research has the potential to provide practical guidance in the development of electronic modules, which are increasingly important in today's digital era. Furthermore, Yuyun Asnawati and Siti Fitria's 'Development of Animated Video Media Based on Canvas Application' also showed high relevance with 46 citations. This research highlights innovations in learning media, which are crucial for improving student engagement and learning effectiveness. Maulidah Hasanah and her colleagues' work entitled 'Development of E-Modules Based on Flip Fid' with 44 citations shows that an interactive approach can improve understanding of concepts in science learning. This underlines the importance of more dynamic methods in education. Furthermore, research by Riri Silmi and team titled 'Implementation of Creative Thinking Skills in Science Learning' with 42 citations shows the importance of creative thinking skills in education. These skills are not only relevant in an academic context but also important in preparing students for challenges in the real world. Putu Lusi Antari and team's publication on 'Electronic Module Based on Project-Based Learning' with 39 citations shows that a project-based approach in learning can improve student learning outcomes. This research is in line with global trends that emphasise active and participatory learning.

Table 5 Keywords which is related to the Electronic Module in Increasing Learning Motivation

Electronic Module (E-module)	**Electronic Modules in Improving Learning Motivation**
81	16

Source: Harzing's Publish or Perish

Table 5 presents data on keywords related to "Electronic Modules" in the context of increasing learning motivation. The keyword "Electronic Module (E-module)" recorded 81 occurrences, indicating that this term is often used in related publications and research. Then the keyword "Electronic Module in Increasing Learning Motivation," which recorded 16 occurrences. Although "Electronic Module" is more widely discussed, more specific terms regarding increasing learning motivation still have a relationship but with a much smaller number. There is significant interest in the application of electronic modules, especially in the aspect of learning motivation.

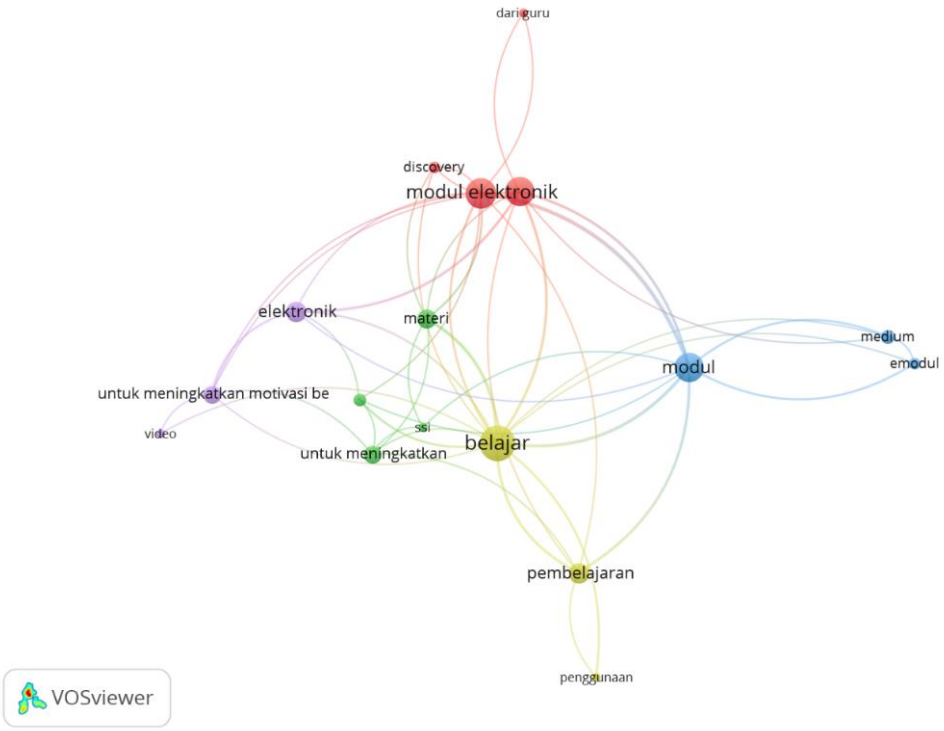

Fig. 2 Network Visualization of the Occurrence of Common Keywords

Figure 2 is a conceptual visualization that illustrates the relationship between keywords related to "e-modules" and aspects related to learning. From this word, there are a number of links that lead to other keywords, such as "learning," "modules," and "electronics." The word "learning" appears at the bottom in yellow, indicating its strong association with e-modules in the context of learning. Some other keywords that appear include "materials," "videos," and "use," which indicate components that contribute to the use of e-modules in the learning process. Some other terms relate to motivation, such as "to increase learning motivation," which expresses the purpose of using e-modules. The connections formed between these keywords indicate the complexity and relevance of each term in the context of learning and the use of technology in it.

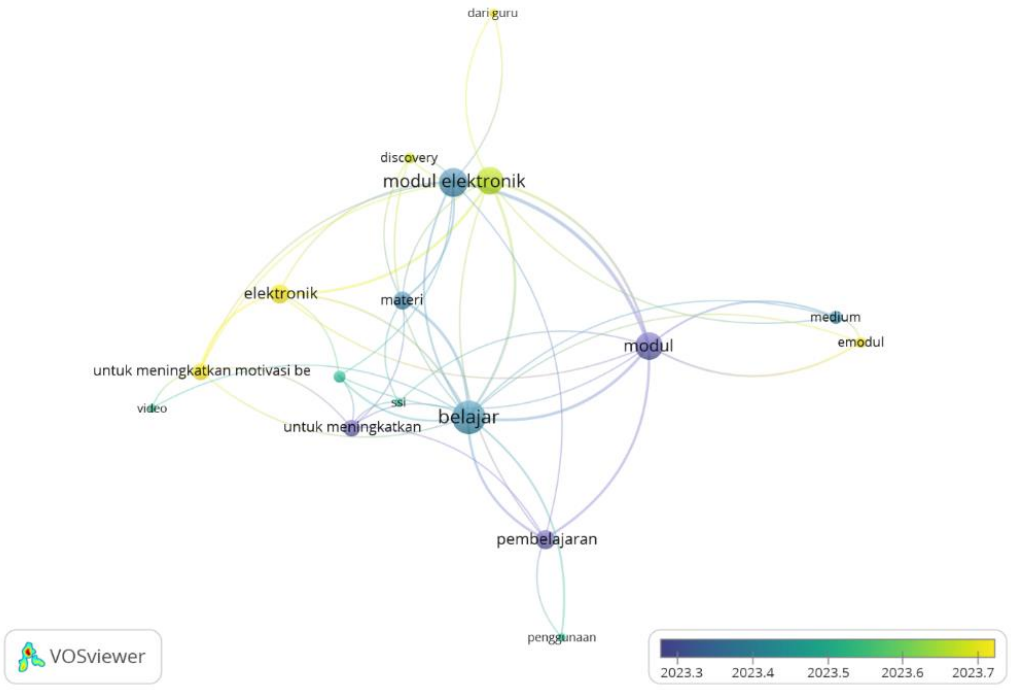

Fig. 3 Overlay Visualization of Keyword Co-Occurrence Based on 3 Years of Publication

Figure 3 is a visual representation that explains the network of concepts related to "e-modules" in the context of learning. At the center of the visualization is the term "e-modules," which is marked in a brighter color, indicating its high relevance and interconnectedness with other concepts. From this main term, a number of related keywords emerge, such as "learning," "modules," and "electronics," illustrating the close relationship between the use of e-modules and the learning process. At the bottom, the word "learning" is colored blue, indicating the importance of learning in this network. In addition, terms such as "materials," "videos," and "use" also appear, indicating components that contribute to the use of e-modules in education. There is also the word "to increase learning motivation," which relates to the purpose of using e-modules. This visualization also shows changes over time, with the color scale at the bottom indicating the time span between March 2023 and July 2023. This creates a narrative about the development of the interconnectedness between keywords over time.

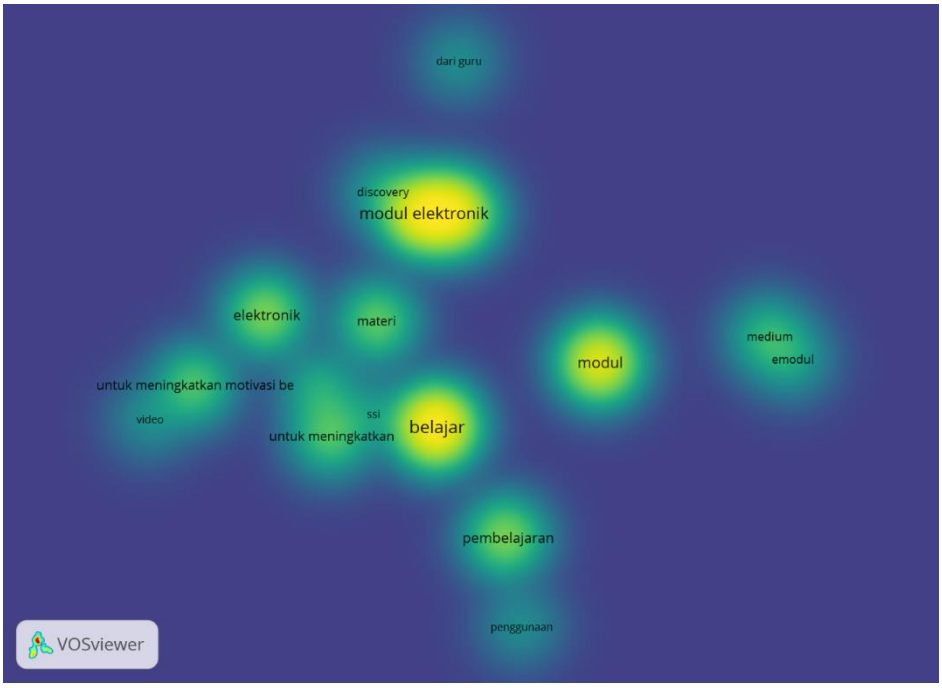

Fig. 4 Density Visualization VOS Viewer

Figure 4 is a heatmap visualization showing the relationship between keywords related to "e-modules" in the context of learning. In this map, the term "e-modules" appears at the top and is marked in bright yellow, indicating that this term has a high level of relevance. Surrounding it are several other keywords, such as "learning," "modules," and "electronics," which are also brightly colored, indicating a strong relationship with the main term. In particular, "learning" is in the center in yellow, indicating the importance of the learning aspect in the context of e-modules. Other words such as "materials," "videos," and "use" are dimmer in color, indicating their weaker relationship compared to the more central term. There is also the phrase "to increase learning motivation" located near "learning," indicating the purpose of using e-modules. This visualization uses a dark purple background, which highlights the bright spots on the keywords, making it easier to see which ones are more dominant in the discussion.

From the image above, Table 6 describes the color clusters and discussion topics according to the clusters searched for based on Vosviewer.

Table 6 Cluster Mapping in VOS Viewer

Cluster	Color	Discussion Topics in Cluster
1	Red	From teachers, discovery, electronic modules, students
2	Green	Material, elementary school students, ssi, to improve
3	Blue	Emodule, medium, module
4	Yellow	Study, learning, use
5	Purple	Electronics, to increase learning motivation, video

Source: VOS Viewer

The mapping of article keyword similarities is divided into several clusters with different colors for each item . Table 6 presents the cluster mapping resulting from the data analysis using VOS Viewer. The first cluster, colored red, includes topics such as "from teachers," "discovery," and "electronic modules," and "students," indicating a focus on the role of teachers and the use of electronic modules in education. The second cluster, colored green, includes topics such as "materials," "elementary school students," "ssi," and "to improve," which relate to teaching materials and students at the elementary education level. The third cluster, colored blue, includes the terms "emodule," "medium," and "module," indicating the role of technology in learning. The fourth cluster, colored yellow, focuses on "learning," "learning," and "use," highlighting aspects related to the learning process and methods. The fifth cluster, colored purple, includes "electronics," "to improve learning motivation," and "video," indicating the relationship between technology and motivation in learning.

Electronic modules provide students with convenience in learning the material because they contain interesting features that increase students' motivation to learn and help improve student learning outcomes. In fact, the use of electronic modules in learning is intended so that educational goals can be achieved effectively and efficiently (Azkiya et al., 2022). With modules, students can follow learning programs according to their own speed and abilities, learn more independently, can find out their own learning outcomes and emphasize optimal mastery of learning materials. It can be said that modules are quite ideal for use as independent learning media or distance learning (Jamil, 2022; Rahmadana & Jailani, 2022; Wahrini & Makmur, 2023). Learning with modules can increase students' learning motivation; after the end of the lesson, educators can immediately find out which ones have met the learning achievements and which ones have not; the speed of students in achieving learning outcomes according to their abilities; the learning load is distributed more evenly throughout the semester; education is more effective (Maulida et al., 2021; Putri et al., 2024; Rahmi et al., 2024).

Another study conducted by P. K. Sari & Sutihat, (2022) revealed that electronic modules are said to be effective as teaching materials because of the change in students' learning styles that used to be monotonous, centered on teachers. With the use of these electronic modules, students learn more flexibly, communicatively and independently. This finding is supported by research Jonvi et al., (2023); Linda et al., (2021); Yani et al., (2023) showing that E-Modules can increase students' independence in learning, which leads to improved learning outcomes.

The bibliometric analysis conducted in this study shows a positive trend in publications related to e-modules and learning motivation, which is the main focus of the research question. Table 1 of the analysis reveals that the number of publications increased significantly year-on-year, with 59 publications recorded in 2023. This figure not only reflects the growing interest among researchers, but also demonstrates the relevance of using e-modules in the modern educational context. This increase in publications can be interpreted as a response to the need to integrate technology in learning, especially in the ever-evolving digital era.

Furthermore, Table 5 shows that the keyword 'electronic module' appears 81 times in the analysed literature, confirming that e-modules have become a major focus in educational research. This suggests that researchers are increasingly realising the potential of e-modules in improving student motivation and learning outcomes. Research focusing on e-modules not only explores new ways of delivering materials, but also assesses their impact on student engagement and overall learning effectiveness.

With the increasing number of publications and frequency of occurrence of this buzzword, it is clear that e-modules are not only a learning tool, but also an important research subject in understanding the dynamics of learning motivation. This research seeks to answer the question of how e-modules can be optimised to increase student motivation, as well as the challenges and opportunities that exist in their implementation. Thus, the results of this analysis provide a strong foundation for researchers and educators to continue exploring and developing e-modules as an integral part of effective and innovative learning strategies.

While many studies have addressed the use of technology in education in general, this research accentuates a specific focus on e-modules, which make a new and significant contribution to the understanding of the effectiveness of digital media in subjects that students often find difficult.

The results of the bibliometric analysis show that publications related to e-modules and learning motivation continue to increase, with 59 publications in 2023 and the appearance of the keyword 'electronic module' 81 times in the literature. This indicates that there is a growing awareness among researchers of the importance of e-modules in enhancing students' learning experience, especially in the often challenging subject of mathematics.

E-modules, as a form of interactive learning media, not only provide information but also create an engaging learning environment. This research shows that when students engage with e-modules, they tend to feel more motivated and excited about learning. This media allows students to learn independently, set their own learning pace, and access additional resources that can help understand complex mathematical concepts.

This study shows that the use of e-modules is not only relevant in the local context but also in line with global trends in technology-based education. There are several gaps that can be used as a focus for further research, namely that there is still little research exploring the long-term impact of the use of e-modules on students' understanding of mathematical concepts. Then, future research can look at the aspects of accessibility and inclusivity in the use of e-modules that can be adapted to meet the needs of students with various backgrounds, including students with disabilities or those from remote areas, which are still rare. Research on social interactions in the use of e-modules has also not been widely discussed. Examining collaboration between students through e-modules can increase motivation and learning outcomes so that research will be more interesting. The use of new technologies, such as augmented reality (AR) or virtual reality (VR) in e-modules, can be the focus of innovative research. This technology has the potential to create a more immersive and engaging learning experience. Research by Susanti et al., (2024) found that the use of monotonous learning media can reduce student motivation. This shows that choosing the right media, such as e-modules, is very important in creating a positive learning environment. In addition, research by Aniyawati & Dewi, (2023); Jehadus et al., (2024); Lestari et al., (2025) shows that the use of technology in education can help students overcome anxiety about mathematics subjects, which are often considered difficult.

Conclusion

In the last three years, from 2023 to 2025, this research analysed one hundred articles, journals and proceedings related to e-modules aimed at increasing students' learning motivation in mathematics subjects in primary schools. Based on the year of publication, 2023 was the year with the most articles and journals published, totaling 59 publications, then when viewed from the publishing institution, Ganesha University of Education had the highest number of documents, namely 6 documents and 106 citations. Meanwhile, when viewed from the publishing publisher, the Scientific Journal of Education and Learning had the most document publications along with the number of citations. When viewed from the author, Yunita Lastri received 87 citations, making it the highest among other publications. When viewed from the keywords, "Electronic Module (E-module)" recorded 81 occurrences, while the keyword "Electronic Module in Improving Learning Motivation," recorded 16 occurrences. Through bibliometric analysis, it was found that there was a positive trend in publications related to e-modules, indicating increasing attention to the implementation of technology in education. E-modules not only provide interactive and interesting learning materials, but can also meet the diverse needs of students, thus encouraging their involvement in the learning process. Then, for further research, it can expand the keywords that will be used for research topics, can use databases such as Scopus and WoS to search for or collect data. In addition, it can be a new idea for researchers and teachers to develop writings related to e-modules and increasing student learning motivation. Researchers can develop gamification-based e-modules that explore components such as points, badges, and challenges can make learning more interesting and increase student motivation. In addition, creating e-modules that are specifically designed for students with special needs, so that they can meet various learning needs and increase accessibility. Research that examines the application of e-modules in different cultural contexts can also provide insight, by comparing their effectiveness in various regions, including remote areas. In addition, exploring new technologies such as augmented reality (AR) or virtual reality (VR) in e-modules can create a more immersive learning experience, thereby increasing student motivation. E-modules can be developed as formative assessment tools, by exploring direct feedback from e-modules can affect student motivation and development.

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