Systematic Literature Review: Fractional Learning Models and Media in Elementary School

Jasmine Emmanuela Medah[1], Candra Utama[1]

[1]First Affiliation
[2]Department of Primary School Teacher Education, Universitas Negeri Malang, Malang, Indonesia
*Corresponding author, email: jasmine.emmanuela.2301516@students.um.ac.id

Keywords
Fractions
Learning models
Learning media

Abstract
Fractions are one of the mathematics topics that often cause difficulties for elementary school students because of their abstract nature. This research aims to systematically examine various learning models and media that are able to improve students' understanding of fractional materials. The method used was qualitative with a Systematic Literature Review (SLR) approach to ten selected scientific articles based on relevance, research methods, and their contribution to learning outcomes. The results of the study show that learning models such as Contextual Teaching and Learning (CTL), Problem-Based Learning (PBL), Discovery Learning, and Cooperative Learning are consistently able to improve the understanding of fractional concepts. On the other hand, concrete, visual, and interactive digital learning media have proven to be effective in helping students understand fractions in a fun and contextual way. These findings affirm the importance of selecting learning models and media that are in harmony with students' cognitive development stages, as well as providing academic contributions in enriching the reference for the development of mathematics learning strategies at the elementary school level.

1. Introduction

Mathematics is one of the basic subjects that plays an important role in shaping students' logical, analytical, and systematic thinking skills. At the elementary school level, mathematics is the initial foundation for the development of numerical skills and the understanding of more complex mathematical concepts at the next level (NCTM, 2000). One of the topics that is quite challenging in elementary mathematics learning is fractions.

In the Merdeka Curriculum, elementary school mathematics learning in Indonesia, based on the Ministry of Education and Culture (2024), fractional concept began to be introduced since grade II of elementary school. Fractions are part of rational numbers that are often considered difficult by students because they involve abstract representations and relationships between two numbers (Hutangalung, 2024). Students' difficulties in understanding fractions are generally caused by a lack of mastery of basic concepts, misconceptions about the meaning of fractions, and learning approaches that are still procedural and lack of context.

This phenomenon is also observed by researchers in several schools in Malang City. Students often experience myoperception, such as assuming that fractions with more numerators are always of greater value, or performing fraction counting operations without equalizing denominators first. The results of this observation show that students often experience confusion in comparing fractions, simplifying, or performing calculation operations because they do not understand the conceptual meaning of the fraction itself. To overcome this, it is necessary to choose the right learning model and effective learning media.

The learning model is a conceptual framework consisting of a systematic pattern of procedures developed based on theories used to organize the teaching and learning process to achieve learning objectives. The learning model involves the selection of approaches and the creation of a structure of students' methods, skills, and activities. The existence of learning stages or syntax is the main characteristic of a learning model (Purnomo et al., 2022). Meanwhile, learning media is a tool that can be used to help students learn in a more effective and fun way. This medium is used to convey learning messages and attract students' attention, interests, thoughts, and emotions to achieve learning goals (Fadilah et al., 2023).

On the other hand, learning outcomes are defined as changes in behavior or mastery of competencies achieved by students after the learning process, these results include cognitive, affective, and psychomotor aspects (Setiawan & Sudana, 2018). In the context of fractions, learning outcomes can be seen from the extent to which students are able to understand the concept of fractions conceptually, perform fraction counting operations correctly, and apply the concept in everyday situations.

The use of the right learning model, and supported by effective learning media, can improve student learning outcomes, especially in the context of fractions. Learning models and media are interconnected in influencing student learning outcomes, because the right learning model will increase the effectiveness of media use, while attractive and appropriate media will strengthen the learning process designed in the model, thus together encouraging the improvement of student learning outcomes. However, there are research gaps that still need to be further reviewed, namely:

a. There is a lack of systematic studies that identify the effectiveness of a combination of models and learning media in improving fractional learning outcomes.

b. There is a lack of literature synthesis that discusses the compatibility of models and media with the cognitive development stage of elementary school students based on pedagogical principles and educational psychology.

c. There has been no comprehensive literature review that explicitly maps the trends of fractional learning models and media in the last 10 years, both nationally and internationally.

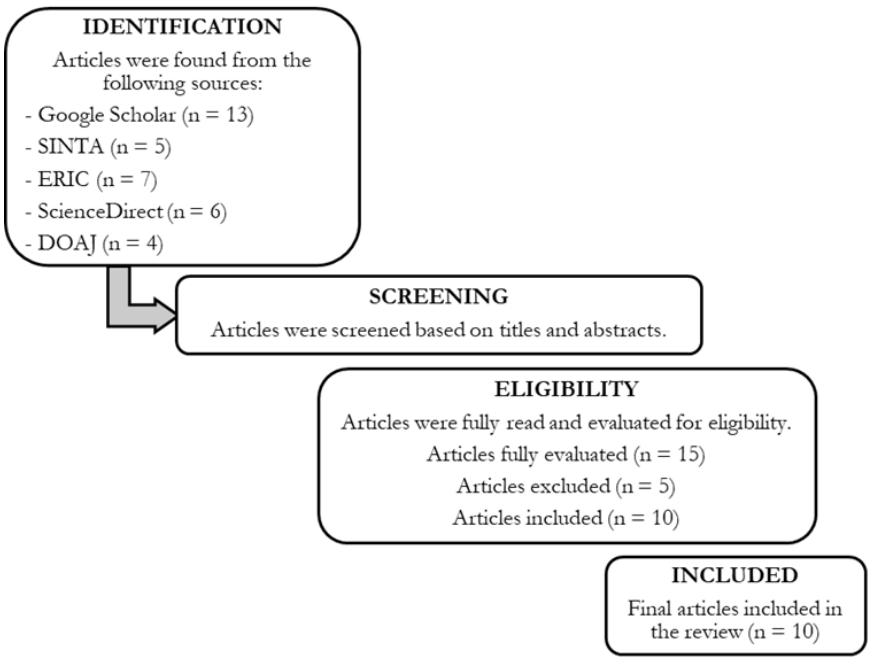
Therefore, the formulation of the problem to be answered in this study includes three main points. First, what are the learning models and media that have been used in fractional learning in elementary schools based on the results of literature review. Second, how effective the model and media are in improving students' understanding of the concept of fractions. Third, what are the pedagogical implications of the selection of fractional learning models and media on learning practices at the elementary school level.

This article aims to review and evaluate various models and learning media that are relevant and effective in helping elementary school students understand the concept of fractions. By tracing various approaches that have been developed in educational practice and research, this article is expected to provide insight for teachers in choosing appropriate models and media, so that fractional learning can be more contextual, fun, and easy for students to understand.

2. Method

This study uses a qualitative method with a Systematic Literature Review (SLR) approach. This approach was chosen because it allows the authors to collect and analyze various research results in a systematic and structured manner, resulting in a comprehensive synthesis of knowledge related to the learning models and media used in teaching fractions to students in elementary schools. The study grouped the findings into two main focuses: (1) the learning model used in fractional teaching, and (2) the learning medium used to support fractional learning.

The authors used electronic databases such as Google Scholar, SINTA, ERIC (Education Resources Information Center), ScienceDirect, and DOAJ (Directory of Open Access Journals) to search and collect articles published in the period 2020 to 2025. Articles that meet the criteria are then analyzed through several stages, starting from keyword identification, filtering relevant articles with titles, data identification, data grouping to interpretation of results. Of the 20 articles analyzed, as many as 10 articles were selected because they featured the use of learning models and media that were considered relevant, and effective in improving students' understanding and learning outcomes in fractional topics. Here is a PRISMA flowchart illustrating the systematic process of searching and selecting articles:



3. Results and Discussion

They should be combined. The study results should be clear and concise. Restrict the use of tables and figures to depict data that is essential to the message and interpretation of the study. The results should be presented in a logical sequence in the text, tables and illustrations. The part of result exposes the findings obtained from research data which is related to the hypotheses. The results should summarize (scientific) findings rather than providing data in great detail. The discussion should explore the significance of the results of the work. Explains the findings obtained from research data along with theory and similar research comparison. Make the discussion corresponding to the results, but do not reiterate the results. The following components should be covered in discussion: How do your results relate to the original question or objectives outlined in the Introduction section (what/how)? Do you provide interpretation scientifically for each of your results or findings presented (why)? Are your results consistent with what other investigators have reported (what else)? Or are there any differences?. Include in the discussion the implications of the findings and their limitations, how the findings fit into the context of other relevant work, and directions for future research.

3.1. Identify Learning Models and Media

The researcher has conducted a literature review by identifying as many as one hundred and five articles that correspond to the research topic. Of all these articles, fifty-eight articles were selected with titles that were appropriate to the research topic. The selected articles are then re-selected and analyzed to be classified according to the purpose of writing the article. The strategies used by the researcher can be seen in table 1 below.

Table 1. Article Selection Strategy

No.	Discussion Category	Search Results
1.	Search year 2020-2025	65
2.	Relevant titles	21
3.	Articles analyzed	21
Result discussed		10

The articles analyzed in this study were selected based on criteria that have been determined by the author, namely focusing on learning models and learning media that are effectively used to support fractional learning in elementary schools. From the twenty-three articles analyzed, the authors selected ten articles that were considered the most relevant and in accordance with the research objectives. Each article has a different type of learning model and learning medium. The

results of the analysis of this article will discuss the influence of the use of certain learning models and learning media in supporting mathematics learning about fractions in elementary school, shown in table 2 below.

Table 2. Identify Learning Models and Media

Article	Research Methods	Identification	Results
Penerapan Pendekatan Pembelajaran Kontekstual untuk Meningkatkan Pemahaman Konsep Matematika pada Materi Pecahan di Kelas VI Sekolah Dasar (Azaria & Nugraha, 2025)	Quantitative experiments	Learning Model	This study shows that the contextual approach or Contextual Teaching and Learning (CTL) is able to significantly increase students' understanding of the concept of fractions, because learning is directly linked to real situations that are close to their lives. For example, students are invited to recognize fractions through activities such as dividing food or measuring ingredients while cooking. In this way, students not only memorize concepts, but also experience them firsthand so that their understanding becomes more profound and meaningful.
Efektivitas Model Problem-Based Learning terhadap Kemampuan Pemecahan Masalah Matematika Siswa Sekolah Dasar (Widyastuti & Airlanda, 2021)	Quantitative-quasi-experimental	Learning Model	The results showed that students who studied with the PBL model showed better problem-solving skills compared to students who studied conventionally. This model helps students to be more active in critical thinking and find solutions to given math problems. In the topic of fractions, PBL is able to encourage students to be more active in thinking critically in solving fractional problems.
Penerapan Model Pembelajaran Discovery Learning untuk Meningkatkan Pemahaman Konsep Pecahan pada Siswa Kelas III SD Negeri 012 Rambah Samo (Mahmudah & Efendi, 2024)	Quantitative	Learning Model	This study shows that the use of the discovery learning model is able to encourage students to be more active in exploring the concept of fractions. Students who learn through this approach experience significant improvements in understanding fractions, particularly in identifying and manipulating fractions of value. This approach helps students build an understanding of the hands-on experiences they discover themselves in the learning process.
Peningkatan Hasil Belajar Kognitif melalui Model Pembelajaran Kooperatif Tipe Number Head Together (NHT) Tema Perkalian dan Pembagian Pecahan (Sari & Suarni, 2020)	Classroom Gap Research (PTK)	Learning Model	This study shows that the use of the Numbered Head Together (NHT) type cooperative learning model has succeeded in improving students' understanding of fractional topics, especially in multiplication and division operations. Students become more active during the learning process, and their learning outcomes improve from before and after the action is taken. This model also helps students learn through social interaction, increasing active participation in learning as well as students' mathematical communication skills.
The effect of using fractional Edu Card game media on learning interest in mathematics subjects of elementary school students in Makassar City (Rahman, Nurhaedah, & Raihan, 2022)	Quantitative experiments	Learning Media	This study found that the use of concrete media in the form of *Fractional Edu Card* games is effective in increasing students' interest in learning mathematics subjects, especially fractional topics. This medium helps students understand abstract concepts in a more fun and interactive way. In addition to clarifying concepts, concrete media

			also create a meaningful learning experience and motivate students to be more active in participating in learning.
Pengaruh Penggunaan Media Gambar Terhadap Pemahaman Matematis Dalam Menyelesaikan Soal Cerita Materi Pecahan (Silalahi, Limbong, Hutagaol, & Pangaribuan, 2023)	Mixed methods	Learning Media	Visual media has an important role in helping students understand the concept of fractions that tend to be abstract. This study found that the use of visual fraction models in elementary classes was able to build a strong foundation of understanding, especially in recognizing and manipulating fractions.
Enhancing mathematical understanding of fractions through image media: A study in primary education (Samritin, et al., 2024)	Quantitative experiments	Learning Media	The use of visual media such as pictures has been proven to have a positive effect on the mathematical ability of grade IV students in solving story problems in fractional topics. Students who studied with image media obtained an average post-test score of 90.72, indicating a significant improvement in the understanding of fractional concepts.
Elementary teachers' perceptions and enactment of supplemental, game-enhanced fraction intervention (Hunt, et al., 2023)	Mixed methods	Learning Media	The results of the study show that technology-based educational games are able to actively increase student participation. Teachers also feel that this approach makes it easier to convey abstract fractional concepts so that it becomes easier for students to understand. In general, the use of digital games is considered effective as a bridge between academic content and children's learning styles that are more contextual and fun.
Mobile game for equality of fractions for elementary school students (Wulandari & Amir, 2021)	Quantitative	Learning Media	This study shows that the use of digital media in the form of mobile applications can have a positive impact on mathematics learning, especially on fractional equality concept. The application developed, namely Equality of Fractions, is designed with an interactive and easy-to-understand interface, so that it is able to attract the attention of students. As a result, students not only understand the concept of fractions visually faster, but are also more motivated to learn as the learning experience becomes more enjoyable and less boring.
Pengembangan Media Pembelajaran Audio Visual Berbasis Aplikasi Animaker MACA (Materi Pecahan) Kelas 5 Sekolah Dasar (Kusuma Wijaya, 2024)	R&D	Learning Media	This study shows that the development of audio-visual media using the Animaker MACA application is able to increase students' interest and understanding of fractional topics. This media makes it easier for students to understand fractional operations such as addition, subtraction, multiplication, and division, as well as making learning more interesting and interactive.

Based on the results of the literature review that has been presented in table 2, it shows that teaching the concept of fractions to elementary school students requires an approach that is not only conceptual but also concrete and contextual.

3.1.1. The Importance of Choosing the Right Model

Various learning models found in literature studies, such as Problem-Based Learning (PBL), Discovery Learning, Contextual Teaching and Learning (CTL), and cooperative learning, make significant contributions to improving the understanding of fractional concepts.

PBL and CTL have proven to be able to relate the fractional topics to the context of students' daily lives. This helps students build meaning to the concept of fractions more realistically. Research by Widyastuti & Airlanda (2021) and Azaria & Nugraha (2025) showed a significant improvement in students' problem-solving skills and participation in fractional learning after using contextual and problem-based approaches.

Discovery Learning provides opportunities for students to build concepts independently. This approach is in line with the theory of constructivism, which states that knowledge is constructed by students through active learning experiences (Piaget, 1973). Mahmudah & Efendi (2024) show that this approach is effective in developing students' conceptual understanding of fractions, especially on the topic of value-added fractions.

Numbered Heads Together (NHT) type of Cooperative Learning is also widely used, as it helps students discuss and reflect on their understanding. Sari & Suarni (2020) show that cooperative models can improve students' mathematical communication skills and confidence when solving fractional problems.

3.1.2. Learning Media that Supports Understanding

Learning media is an important factor in overcoming the difficulty of fractional learning. The results of the literature review show that the use of concrete and visual media is still the dominant approach, arguing that elementary school students are still in the concrete operational stage according to Piaget's theory of cognitive development (1973).

a. **Concrete Media** such as fractional blocks, number lines, and circle pieces help students visualize the concept of parts of the whole and fractional operations. Studies by Rahman, Nurhaedah, & Raihan (2022) underscore the importance of manipulative experiences in reinforcing fractional representations.

b. **Visual and Picture Media** is very effective for explaining abstract concepts, such as fractional comparison. This visualization has been shown to be able to reduce misconceptions and increase average student scores (Silalahi, Limbong, Hutagaol, & Pangaribuan, 2023), (Samritin, et al., 2024).

c. **Digital and Interactive Media** are also starting to gain a wider place in fractional learning. Interactive multimedia and technology-based educational games can increase learning motivation and provide direct feedback to students. Hunt, et al. (2023), Wulandari & Amir (2021) and Kusuma Wijay (2024) noted that students who learn using interactive multimedia show significant improvements in understanding and interest in learning.

3.1.3. Suitability of Models and Media to Student Development Stagess

In the context of basic education, the success of fractional learning is greatly influenced by the suitability between the model and the media used with the characteristics of students' cognitive development. According to Piaget's (1973) developmental theory, elementary school-age children are at a concrete operational stage, so they need an approach that allows them to "see and touch" mathematical concepts.

Concrete and visual media are more suitable to be used in the early stages of learning to build basic understanding, while digital media can be used as reinforcement or remedy for students who need a diverse approach.

3.2. Conclusion

Based on the results of a systematic study of various imliah articles, it can be concluded that the effectiveness of fractional learning in elementary schools is greatly influenced by the selection of learning models and media that are in accordance with the characteristics of students' cognitive

development. Contextual-based learning models, such as Contextual Teaching and Learning (CTL), Problem-Based Learning (PBL), and Discovery Learning, have consistently shown positive contributions to improving the understanding of fractional concepts. In addition, the use of concrete, visual, and digital-interactive media has been proven to be able to facilitate students in building more meaningful and contextual conceptual representations.

This study confirms that the success of fractional learning in primary schools requires harmonized collaboration between teachers, learning media, and appropriate pedagogical approaches. Teachers play the role of facilitators who understand students' cognitive characteristics, are able to choose appropriate learning models, and effectively integrate relevant media. Fragmented learning is not enough to rely on only one approach, but rather requires synergy between teaching strategies, concrete and digital tools, and teachers' reflective skills to create meaningful learning experiences.

Author Contributions

Jasmine Emmanuela Medah: Conceptualization, Data curation, Writing, Editing, Original draft preparation.

Candra Utama: Supervision, Reviewing.

Funding

No funding support was received.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgement (Optional)

The authors would like to express their sincere gratitude to her beloved father for assisting in finding references, providing valuable feedback during the review process, and offering unwavering moral support, as well as to fellow peers for their help, suggestions, and encouragement troughout this journey.

References

Azaria, T. T., Indryani, I., & Nugraha, U. (2025). Penerapan Pendekatan Pembelajaran Kontekstual untuk Meningkatkan Pemahaman Konsep Matematika pada Materi Pecahan di Kelas VI Sekolah Dasar. Jurnal Basicedu, 9(1), 1–11.

Fadilah, A., Nurzakiyah, K. R., Kanya, N. A., Hidayat, S. P., & Setiawan, U. (2023). Pengertian Media, Tujuan, Fungsi, Manfaat dan Urgensi Media Pembelajaran. Journal of Student Research (JSR), 1(2), 1–17.

Hunt, J., Taub, M., Duarte, A., Bentley, B., Womack-Adams, K., Marino, M., Holman, K., & Kuhlman, A. (2023). Elementary teachers' perceptions and enactment of supplemental, game-enhanced fraction intervention. Education Sciences, 13(11), 1071.

Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi. (2024). Keputusan Kepala Badan Standar, Kurikulum, dan Asesmen Pendidikan Nomor 032/H/KR/2024 tentang Capaian Pembelajaran pada Pendidikan Anak Usia Dini, Jenjang Pendidikan Dasar, dan Jenjang Pendidikan Menengah pada Kurikulum Merdeka. Jakarta: Kemendikbud.

Kusuma Wijaya, F. (2024). Pengembangan media pembelajaran audio visual berbasis aplikasi Animaker MACA (materi pecahan) kelas 5 sekolah dasar. Prosiding Seminar Nasional Kesehatan, Sains dan Pembelajaran, 4(1), 693–699.

Mahmudah, S., & Efendi, R. (2024). Penerapan Model Pembelajaran Discovery Learning untuk Meningkatkan Pemahaman Konsep Pecahan pada Siswa Kelas III SD Negeri 012 Rambah Samo. Jurnal Pendidikan Tambusai, 8(3), 44300-44310.

National Council of Teachers of Mathematics (NCTM). (2000). Principles and standards for school mathematics. Reston, VA: NCTM.

Piaget, J. (1973). To understand is to invent: The future of education. Grossman Publishers.

Purnomo, A., Kanusta, M., Fitriyah, Guntur, M., Siregar, R. A., Ritonga, S., Nasution, S. I., Maulidah, S., & Listantia, N. (2022). Pengantar model pembelajaran. Lombok: Yayasan Hamjah Diha.

Rahman, W. H., Nurhaedah, & Raihan, S. (2022). The effect of using fractional Edu Card game media on learning interest in mathematics subjects of elementary school students in Makassar City. PINISI JOURNAL OF EDUCATION, 3(1), 25-40.

Samritin, Fajar, A., Fadiarni, N. S. T., Rasni, Mimin, S. N., & Adelia, W. O. R. (2024). Enhancing mathematical understanding of fractions through image media: A study in primary education. EDUTREND: Journal of Emerging Issues and Trends in Education, 1(3), 163–175.

Sari, N., & Suarni, N. (2020). Peningkatan Hasil Belajar Kognitif melalui Model Pembelajaran Kooperatif Tipe Number Head Together (NHT) Tema Perkalian dan Pembagian Pecahan. Jurnal Elementary, 3(2), 92–96.

Setiawan, P., & Sudana, I. D. N. (2021). Model pembelajaran kontekstual meningkatkan hasil belajar matematika siswa kelas V sekolah dasar. Jurnal Ilmiah Pendidikan Profesi Guru, 4(1), 85–91.

Silalahi, T. M., Limbong, W. S. br, Hutagaol, R., & Pangaribuan, Y. R. (2023). Pengaruh penggunaan media gambar terhadap pemahaman matematis dalam menyelesaikan soal cerita materi pecahan. BEST Journal (Biology Education, Sains and Technology), 6(2), 336–372.

Widyastuti, R. T., & Airlanda, G. S. (2021). Efektivitas Model Problem-Based Learning terhadap Kemampuan Pemecahan Masalah Matematika Siswa Sekolah Dasar. Jurnal Basicedu, 5(3), 1120–1129.

Wulandari, A., & Amir, M. F. (2021). Mobile game for equality of fractions for elementary school students. International Journal of Elementary Education, 5(4), 525-536.