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Effectiveness of Kipin School media in improving fourth-grade students' Mathematics learning outcomes

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ABSTRACT

Mathematics teaching in elementary schools still faces various challenges, particularly students' limited understanding of fractions and the limited use of interactive digital learning media. This study aims to develop and evaluate the effectiveness of a Mathematics module, based on the Kipin School digital platform, in improving elementary school students' learning outcomes in fractions. This study uses a Research and Development (RnD) approach by applying the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. Data were collected through validation sheets, practicality questionnaires, and pretest-posttest designs, and then analyzed using descriptive statistics, normality tests, paired-samples t-tests, and N-Gain analysis. The results indicate that the module falls within the "very valid" category. Feedback from teachers and students also indicates the "very practical" category because the media is easy to use, interesting, and supports interactive learning. In addition, the effectiveness test results show a significant increase in student learning outcomes after using the media, although the N-Gain value remains relatively low. Therefore, the Kipin school-based module is suitable for use as a digital learning medium to support Mathematics learning in schools.

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ABSTRAK

Pengajaran Matematika di sekolah dasar masih menghadapi berbagai tantangan, terutama pemahaman siswa yang terbatas mengenai pecahan dan penggunaan media pembelajaran digital interaktif yang masih minim. Penelitian ini bertujuan untuk mengembangkan dan mengevaluasi efektivitas modul Matematika berbasis platform digital Kipin School dalam meningkatkan hasil belajar siswa sekolah dasar terkait materi pecahan. Penelitian ini menggunakan pendekatan Penelitian dan Pengembangan (RnD) dengan menerapkan model ADDIE yang mencakup tahap analisis, desain, pengembangan, implementasi, dan evaluasi. Data dikumpulkan melalui lembar validasi, kuesioner kepraktisan, serta tes pretest-posttest, kemudian dianalisis menggunakan statistik deskriptif, uji normalitas, uji t sampel berpasangan, dan analisis N-Gain. Hasil menunjukkan bahwa modul tersebut termasuk dalam kategori "sangat valid". Umpan balik dari guru dan siswa juga menunjukkan kategori "sangat praktis" karena media tersebut mudah digunakan, menarik, dan mendukung pembelajaran yang interaktif. Selain itu, hasil uji efektivitas menunjukkan peningkatan signifikan pada hasil belajar siswa setelah menggunakan media tersebut, meskipun nilai N-Gain masih relatif rendah. Oleh karena itu, modul berbasis sekolah Kipin cocok digunakan sebagai media pembelajaran digital untuk mendukung pembelajaran Matematika di sekolah.

Kata Kunci: *ADDIE; hasil belajar; Kipin School; modul Matematika; sekolah dasar*

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INTRODUCTION

Elementary education is a fundamental stage in building students' intellectual capacity, particularly in mastering literacy and numeracy, which serve as the foundation for lifelong learning. In this context, Mathematics holds a strategic position because it supports the development of logical, systematic, and critical thinking abilities, as well as problem-solving skills, from an early age (Larosa et al., 2026; Purba et al., 2025). Mathematics instruction in elementary school aims not only to enable students to perform arithmetic operations but also to build conceptual understanding that serves as the foundation for subsequent levels of learning and supports students' higher-order thinking skills (Haleem et al., 2022). However, various studies indicate that Mathematics is still often perceived as a difficult, abstract, and uninteresting subject for elementary school students, particularly when conventional, teacher-centered approaches dominate the learning process and make minimal use of instructional media that support conceptual visualization and active student engagement (Bond et al., 2021). These conditions lead to low motivation to learn, limited student engagement, and suboptimal Mathematics learning outcomes.

Furthermore, the characteristics of elementary school students, who are still in the concrete operational stage of cognitive development, mean they require visual, contextual, and interactive learning experiences so that abstract mathematical concepts can be understood more meaningfully and do not lead to misconceptions during the learning process (Hidayana & Lianingsih, 2025). In theory, elementary school students need concrete, visual, and contextual learning experiences to understand abstract mathematical concepts more meaningfully. Therefore, Mathematics learning requires media that bridge abstract concepts, making them more concrete through visualization, simulation, and interactive activities that align with students' developmental characteristics (Bond et al., 2021). Advances in digital technology open new opportunities to transform learning through interactive, flexible, and multimodal technology-based media, thereby creating more engaging and adaptable learning experiences for students (Haleem et al., 2022). Digital learning media enables the integration of text, images, audio, video, animations, and interactive exercises, which have been proven to enhance students' attention, motivation, engagement, and conceptual understanding in Mathematics learning (Mayer, 2021; Scherer et al., 2021).

One of the digital learning innovations emerging in Indonesia is Kipin School. This platform provides access to digital textbooks, practice problems, instructional videos, and other learning resources, available both online and offline. In the context of elementary education, the use of Kipin School has the potential to serve as a pedagogical solution to improve the quality of Mathematics learning because it is capable of delivering an experience that is more engaging, flexible, and aligned with the characteristics of 21st-century learners who are familiar with digital technology (Yulianti et al., 2025). Although the use of digital learning media in Mathematics education has been extensively studied, most previous research has focused primarily on improving student motivation or engagement without comprehensively evaluating the quality of the media. In fact, effective digital learning media must not only be visually appealing but also academically valid, practical for use in learning, and effective in improving student learning outcomes (Nurtanto et al., 2021; Scherer et al., 2021). An

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evaluation of the media's validity is essential to ensure that the content, media design, and language use align with the learning needs and characteristics of elementary school students.

Additionally, the media's practicality must be analyzed to determine how easily it can be used by teachers and students in real learning situations. In contrast, the effectiveness of the media must be tested through improvements in student learning outcomes following its use in instruction (Haleem et al., 2022). Thus, the development of digital learning media requires an approach that is not only technology-oriented but also takes into account pedagogical aspects and students' learning needs comprehensively. Given these circumstances, the use of digital learning platforms such as Kipin School is essential for supporting the transformation of Mathematics education in elementary schools. Kipin School offers a variety of learning features, including e-modules, instructional videos, practice exercises, and digital assessments, which enable students to have a more interactive and flexible learning experience. The use of an integrated digital platform also helps teachers manage learning more systematically by presenting materials, learning activities, and assessments that are interconnected within a single learning medium (Abuhassna et al., 2024).

Recent research indicates that digital platform-based learning can increase student engagement, facilitate the understanding of mathematical concepts, and support more student-centered learning as students can learn more actively and independently (Yulianti et al., 2025). Therefore, the use of Kipin School in elementary school Mathematics education has the potential to improve both the learning process and student outcomes. This study is novel in its focus on developing and testing the effectiveness of a Kipin School digital platform-based Mathematics module on fractions for elementary schools, using a research-and-development approach based on the ADDIE model. Unlike previous studies, which generally assessed only the impact of media on student motivation or learning activities, this study comprehensively analyzes the media's validity, practicality, and effectiveness, thereby providing a deeper understanding of the quality of the developed digital learning media. Additionally, this study employs a pretest-posttest design to systematically measure improvements in student learning outcomes following the use of the Kipin School-based learning media.

This approach is expected to provide empirical contributions to the development of innovative, adaptive, and student-centered Mathematics learning media tailored to the needs of elementary school students in the digital age (Haleem et al., 2022). Based on this background, this study aims to analyze the validity, practicality, and effectiveness of using Kipin School-based learning media in improving elementary school students' Mathematics learning outcomes in the area of fractions. Specifically, this study aims to: 1) test the validity of Kipin School-based Mathematics modules based on evaluations by subject matter experts, media experts, and language experts; 2) analyze the practicality of using the media based on teacher and student responses during the learning process; and 3) evaluate the effectiveness of using the media in improving students' Mathematics learning outcomes by comparing pretest and posttest scores. Thus, the results of this study are expected to provide theoretical and practical contributions to the development of innovative and effective digital learning media to improve the quality of Mathematics learning in elementary schools.

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LITERATURE REVIEW

Digital Learning Media in Elementary School Mathematics Education

Advances in digital technology have brought about significant changes in Mathematics education in elementary schools. Digital learning media are no longer viewed merely as learning aids but also as part of a pedagogical strategy that fosters more interactive, contextual, and student-centered learning. Digital technology in education can increase student engagement, support active learning, and facilitate more flexible and meaningful learning experiences (Haleem et al., 2022). In elementary school Mathematics education, the use of digital media is crucial because mathematical concepts are abstract, often making it difficult for students to grasp the material when instruction relies solely on conventional methods. Therefore, digital media is employed to help visualize mathematical concepts through images, animations, simulations, and interactive activities that are more concrete and easier for students to understand.

Recent studies indicate that digital learning media have a positive impact on the learning outcomes and conceptual understanding of Mathematics among elementary school students. Some research findings indicate that the development of digital Mathematics media in elementary schools is advancing through the use of interactive e-modules, digital platforms, and visually based media, which can increase student engagement in learning (Yulianti et al., 2025). Interactive digital Mathematics media can improve student learning outcomes because the material is presented systematically, engagingly, and is easily accessible (Mayadesti et al., 2025). Furthermore, digital media helps students build conceptual understanding through visual representations and contextual activities aligned with the cognitive developmental characteristics of elementary school students. In the context of fractions, for example, the use of digital media helps students understand relationships between concepts through visualizations of proportions and simulations of arithmetic operations, thereby reducing the potential for mathematical misconceptions (Cirneanu & Moldoveanu, 2024).

From a pedagogical perspective, the effectiveness of digital learning media is determined not only by technological aspects but also by the media's alignment with learning objectives and student needs. Instructional alignment between learning objectives, content, learning activities, and assessment is a key factor in creating effective learning (Hailkari et al., 2022). In the context of elementary school Mathematics learning, digital media that are systematically designed and tailored to students' characteristics can enhance motivation to learn, classroom participation, and student interaction during instruction (Khairunnisa et al., 2025). Thus, digital learning media can be understood as a pedagogical approach that supports the creation of more meaningful, adaptive, and relevant Mathematics learning to the educational needs of the 21st century.

The Concept of Kipin School as a Digital Learning Platform

Kipin School is a digital learning platform designed to support the learning process by providing a variety of interactive learning resources, such as e-modules, instructional videos, practice exercises, and assessment tools, which can be accessed flexibly both online and

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offline. In the context of elementary education, digital platforms like Kipin School have great potential to support Mathematics learning by providing a more visual, interactive, and contextual learning experience aligned with the cognitive development characteristics of elementary school students. Digital learning platforms enable more adaptive, student-centered learning by integrating technology, interactivity, and accessibility (Haleem et al., 2022). In addition, the use of digital learning platforms in elementary school Mathematics can enhance student engagement and the quality of the learning experience by presenting more engaging, multimodal content (Yulianti et al., 2025). Through its digital features, Kipin School enables teachers to present math material more systematically and engagingly, allowing students to learn through visual representations, interactive exercises, and a wider range of learning activities than in conventional learning. The flexibility of access to the digital platform also enables students to learn independently outside class hours, making the learning process more continuous (Damayanti et al., 2024).

From a pedagogical perspective, the use of Kipin School as a digital learning platform serves not only to distribute instructional materials but also as part of an instructional strategy that supports more meaningful Mathematics learning. The effectiveness of digital learning is determined by the integration of learning objectives, learning activities, instructional media, and assessment within a systematic instructional alignment (Hailkari et al., 2022). In its implementation, Kipin School enables the integration of various learning activities, such as discussions, contextual problem-solving, self-directed practice, and digitally based assessments, that can enhance student engagement during learning. Interactive digital learning platforms have also been shown to improve motivation to learn, classroom participation, and elementary students' understanding of mathematical concepts by providing more concrete and multimodal learning experiences (Khairunnisa et al., 2025; Mayadesti et al., 2025). In addition, digital media integrated into contextual learning activities can help students gain a deeper understanding of mathematical concepts than conventional learning (Putri et al., 2025). Thus, Kipin School can be understood as a digital learning platform that not only supports the transformation of educational technology but also reinforces a pedagogical approach that is more adaptive, interactive, and relevant to the needs of elementary school Mathematics education.

Mathematics Learning Outcomes as an Indicator of Instructional Effectiveness

Mathematics learning outcomes are key indicators of the effectiveness of the learning process in elementary schools because they reflect students' success in understanding concepts, applying procedures, and solving mathematical problems. In the context of Mathematics learning, learning outcomes encompass not only cognitive achievements but also logical thinking, problem-solving, mathematical communication, and student engagement throughout the learning process. Effective learning is demonstrated by an improvement in students' abilities following the learning process compared to their initial abilities. Therefore, measuring learning outcomes through pretests and posttests is often used to determine the extent to which a particular instructional medium or strategy improves students' understanding (Smith et al., 2023). Additionally, improvements in Mathematics learning outcomes are also influenced by the quality of instructional alignment between learning

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objectives, learning activities, the media used, and the evaluation system implemented in the learning process (Hailkari et al., 2022).

In elementary school Mathematics education, the use of digital learning media is considered capable of improving learning outcomes because it provides a more concrete, visual, and interactive learning experience. Digital media enable students to understand abstract mathematical concepts through multimodal representations such as images, animations, simulations, and contextual activities, which are easier to comprehend and align with the cognitive developmental characteristics of elementary school students (Cirneanu & Moldoveanu, 2024). Recent research indicates that interactive digital learning media significantly improve students' understanding of mathematical concepts, motivation to learn, and participation compared to conventional instruction (Khairunnisa et al., 2025; Putri et al., 2025). Additionally, the use of digital media in Mathematics instruction helps students gradually build conceptual understanding, thereby reducing the potential for misconceptions in abstract topics such as fractions and arithmetic operations (Firdaus et al., 2024; Sunandar et al., 2025). Thus, Mathematics learning outcomes can be understood as a key indicator for evaluating the success of digital learning media implementation, as improved learning outcomes demonstrate that the media used effectively support a more meaningful, student-centered learning process tailored to the needs of elementary school students.

Theoretical Framework of the Study

The theoretical framework of this study is based on constructivist and digital pedagogy perspectives, which place students at the center of the learning process through active, contextual, and interactive learning experiences. In elementary school Mathematics learning, students need media that can visualize abstract concepts, making them more concrete so that conceptual understanding can be formed gradually and meaningfully. Digital learning media allow students to build conceptual understanding through visual representations, simulations, interactive activities, and contextual problem-solving that align with the cognitive developmental characteristics of elementary school students (Cirneanu & Moldoveanu, 2024).

Furthermore, effective digital learning must be designed adaptively and integrated across learning objectives, content, learning activities, media, and assessment, within a systematic instructional alignment, to support the achievement of student competencies optimally (Hailkari et al., 2022). In this context, the Kipin School digital platform is seen as capable of supporting more student-centered Mathematics learning by integrating e-modules, practice problems, learning activities, and flexible, interactive digital assessments. Therefore, this study posits that the validity, practicality, and effectiveness of digital learning media have a direct relationship with improvements in elementary school students' Mathematics learning outcomes, as media designed to meet pedagogical needs and student characteristics can create more meaningful, engaging, and effective learning (Haleem et al., 2022; Khairunnisa et al., 2025; Putri et al., 2025).

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METHODS

Research Design

This study employed a Research and Development (R&D) approach using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) to develop and test the effectiveness of the Kipin School educational media in improving the Mathematics learning outcomes of fourth-grade elementary school students. The ADDIE model was chosen because it provides a systematic, phased, and structured framework for developing learning products, thereby enabling researchers to conduct a comprehensive analysis of needs, design, development, implementation, and evaluation of the media. In this study, the ADDIE model was used not only to produce a learning media product but also to integrate a quantitative evaluation approach to measure the effectiveness of the media's use in improving student learning outcomes. The effectiveness test used a one-group pretest-posttest design, namely $O_1 \rightarrow X \rightarrow O_2$, where O_1 is the pretest, X is the treatment, namely learning using the Kipin School media, and O_2 is the posttest. This design was used to determine changes in student learning outcomes before and after the use of the learning media. Through this design, the study focused not only on product development but also on the empirical testing of the impact of using the Kipin School media in Mathematics learning.

Research Location and Subjects

The study was conducted at SDN Mulyajaya I, Kutawaluya Subdistrict, Karawang Regency. The research subjects were 29 fourth-grade students. The subjects were selected using total sampling, in which all students in a single class were included as research participants, as the study focused on the implementation of learning media in a whole-class context. The selection of fourth-grade students was based on the suitability of the Mathematics material, particularly fractions, which conceptually requires the support of concrete learning media in accordance with the concrete operational cognitive development stage of elementary school students. In addition to students, this study also involved expert validators comprising subject matter experts, media experts, and language experts, to assess the suitability of the developed product. Classroom teachers were also involved as practitioners to evaluate the practicality of using the media in real-world learning situations. The involvement of these various stakeholders aims to ensure that the developed product meets the criteria of validity, practicality, and effectiveness.

Development Procedure

This research procedure follows the five main stages of the ADDIE model: Analysis, Design, Development, Implementation, and Evaluation, which provides a systematic framework for designing, developing, and evaluating educational products (Adeoye et al., 2024). This model was chosen because it offers a structured, iterative process that ensures instructional products are developed based on learner needs, pedagogical alignment, and continuous evaluation.

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Figure 1. ADDIE Model for Kipin School Mathematics Modules
Source: Author's Documentation

The research procedure followed the five main stages (see **Figure 1**) of the ADDIE model as follows:

1. Analysis Stage. The analysis phase is the initial foundation of the module design and development process. This stage involves curriculum analysis, student needs analysis, analysis of student characteristics, and identification of Mathematics learning issues in fourth grade. The analysis focuses on students' difficulties in understanding fractions and the limitations of the learning materials used by teachers.
2. Design Stage. In this stage, the structure of the Kipin School-based Mathematics e-module was designed, learning objectives were formulated, materials were selected, the media interface was designed, and research instruments, including validation sheets, practicality questionnaires, and pretest-posttest questions, were developed.
3. Development Stage. The initial product, a Kipin School media-based Mathematics learning module, was developed in accordance with the established design. Subject-matter, media, and language experts then validated the product. Feedback from the validators was used as the basis for revising the product to ensure it met academic and pedagogical standards.
4. Implementation Stage. The revised product was implemented in fourth-grade Mathematics lessons. Before using the media, students were given a pretest to assess their initial abilities. After the lessons using the Kipin School media were completed, students were given a posttest to measure improvements in learning outcomes.
5. Evaluation Stage. The evaluation phase employed both formative and summative methods to assess the media's validity, practicality, and effectiveness. This evaluation aimed to assess product quality and measure the media's success in improving student learning outcomes.

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Research Instruments

The instruments used in this study include:

1. Validation Sheet used to assess the suitability of the media based on content, media design, and language by experts.
2. Practicality Questionnaire used to obtain data on teachers' and students' responses regarding the ease of use, appeal, and usefulness of the learning media.
3. Learning Outcome Test Pretests and Posttests were used to measure changes in students' Mathematics learning outcomes before and after the use of the Kipin School media.

Data Analysis Techniques

The data were analyzed using the following descriptive and inferential quantitative techniques:

1. Validity Analysis. Expert validation scores were calculated using percentages to determine the product's suitability category (Anggara & Abdillah, 2023).
2. Practicality Analysis. Teacher and student questionnaire data were analyzed using percentages to determine the level of media practicality (Alarcón & Blanca, 2020).
3. Normality Test. A Shapiro-Wilk normality test was conducted to assess the normality of the pretest and posttest data. Data were considered normally distributed if the significance value was > 0.05 (Ahadi & Zain, 2023).
4. Hypothesis Testing. A paired t-test was used to determine whether there was a significant difference between the pretest and posttest scores. If the p-value is < 0.05, then H_0 is rejected, and H_1 is accepted, meaning that the use of the Kipin School media has a significant effect on improving students' Mathematics learning outcomes.
5. N-Gain Analysis was used to determine the level of improvement in students' learning outcomes after the treatment, categorized as low, moderate, or high (Triyono et al., 2024).

Research Ethics

This study was conducted after obtaining permission from the school and involved collaboration with the classroom teacher. The entire research process was carried out in accordance with the principles of educational research ethics, including the confidentiality of student data, the use of data solely for academic purposes, and the implementation of teaching methods that did not harm the research subjects.

RESULTS AND DISCUSSION

Results of the Analysis of the Kipin School-Based Mathematics Module

In the early stages of developing the Kipin School media, a needs analysis was conducted to serve as the foundation for designing learning materials aligned with students' characteristics and needs. This stage aimed to gather information and recommendations to support the

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design process of the media to be developed. The needs analysis was conducted through classroom observations, interviews with teachers, curriculum analysis, and identification of the characteristics of fourth-grade elementary school students. The results of the needs analysis are described as follows:

Curriculum Analysis

The results of the curriculum analysis indicate that the developed materials focus on fourth-grade elementary school Mathematics, specifically on fractions. The development of the materials is based on the learning outcomes, core competencies, learning objectives, and indicators outlined in the current curriculum. This analysis aims to ensure that the e-modules developed align with the requirements of the elementary school curriculum. Therefore, the modules are designed systematically and progressively to help students understand fraction concepts from simple to more complex levels.

Analysis of Student Characteristics

Based on an analysis of student characteristics, fourth-grade elementary school students are at the concrete operational stage and therefore require learning that is visual, contextual, and interactive. At this stage of development, students tend to grasp mathematical concepts more easily when they are presented through concrete examples, illustrations, and learning experiences closely tied to daily life. Therefore, the e-module was developed using a visual approach, featuring images, illustrations, interactive activities, and digital content delivery to make abstract mathematical concepts—particularly fractions—easier for students to understand.

Analysis of Learning Issues

The analysis of learning issues indicates that students' interest in learning Mathematics remains relatively low. This is because Mathematics is often perceived as a difficult, abstract, and uninteresting subject. Additionally, the monotonous learning process reduces students' motivation to engage in learning actively. Given these conditions, the development of the e-module aims to create a more engaging and enjoyable learning experience by integrating Kipin School's digital media. The use of digital media is expected to enhance motivation to learn and student engagement, and to create a more interactive Mathematics learning environment.

Analysis of the Instructional Media Used

An analysis of the instructional media reveals that textbooks and lecture-based methods still dominate the previous learning process. This situation resulted in students lacking interactive and exploratory learning experiences. Teacher-centered learning also tends to make students passive in understanding mathematical material. Therefore, innovation in learning media is needed through digital e-modules that provide a more varied and flexible learning

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experience. The developed e-modules are designed to be accessible through the Kipin School platform, thereby supporting digital learning both at school and at home.

Teacher Needs Analysis

Based on the results of the teacher needs analysis, it was found that teachers require learning materials that are easy to use, aligned with the curriculum, and capable of helping explain mathematical concepts to students more concretely. Teachers also need practical learning tools that support digital technology-based learning. Therefore, the e-module was developed with a systematic design that is easy to operate and supports the teacher's role as a learning facilitator. With this e-module, teachers are expected to present fraction material more easily, engagingly, and effectively.

Digital Platform Analysis

The results of the digital platform analysis indicate that Kipin School has great potential as a digital learning medium. This platform provides flexible access to learning, both online and offline, and integrates learning materials, exercises, and assessments into a single system. Additionally, Kipin School is easily accessible to teachers and students, thereby supporting the implementation of digital learning in elementary schools. Based on these analysis results, Kipin School was selected as the platform foundation for developing Mathematics e-modules because it is deemed capable of supporting a more interactive, practical learning process aligned with 21st-century learning needs.

Based on the analysis results, the development of Kipin School-based Mathematics modules is necessary to address the need for more interactive, visual, and tailored learning for elementary school students. The analysis results indicate that the limitations of conventional learning media influence low interest and poor Mathematics learning outcomes; therefore, an innovation in the form of a digital e-module is needed to enhance conceptual understanding, learning motivation, and the quality of Mathematics learning for fourth-grade elementary school students. This serves as the basis for determining the module design in the subsequent stage.

Results of the Design of the Kipin School-Based Mathematics Module

During the design phase, the researchers developed a module blueprint based on the results of a needs analysis, which covered content structure, learning flow, integration with the Kipin School platform, and assessment tools.

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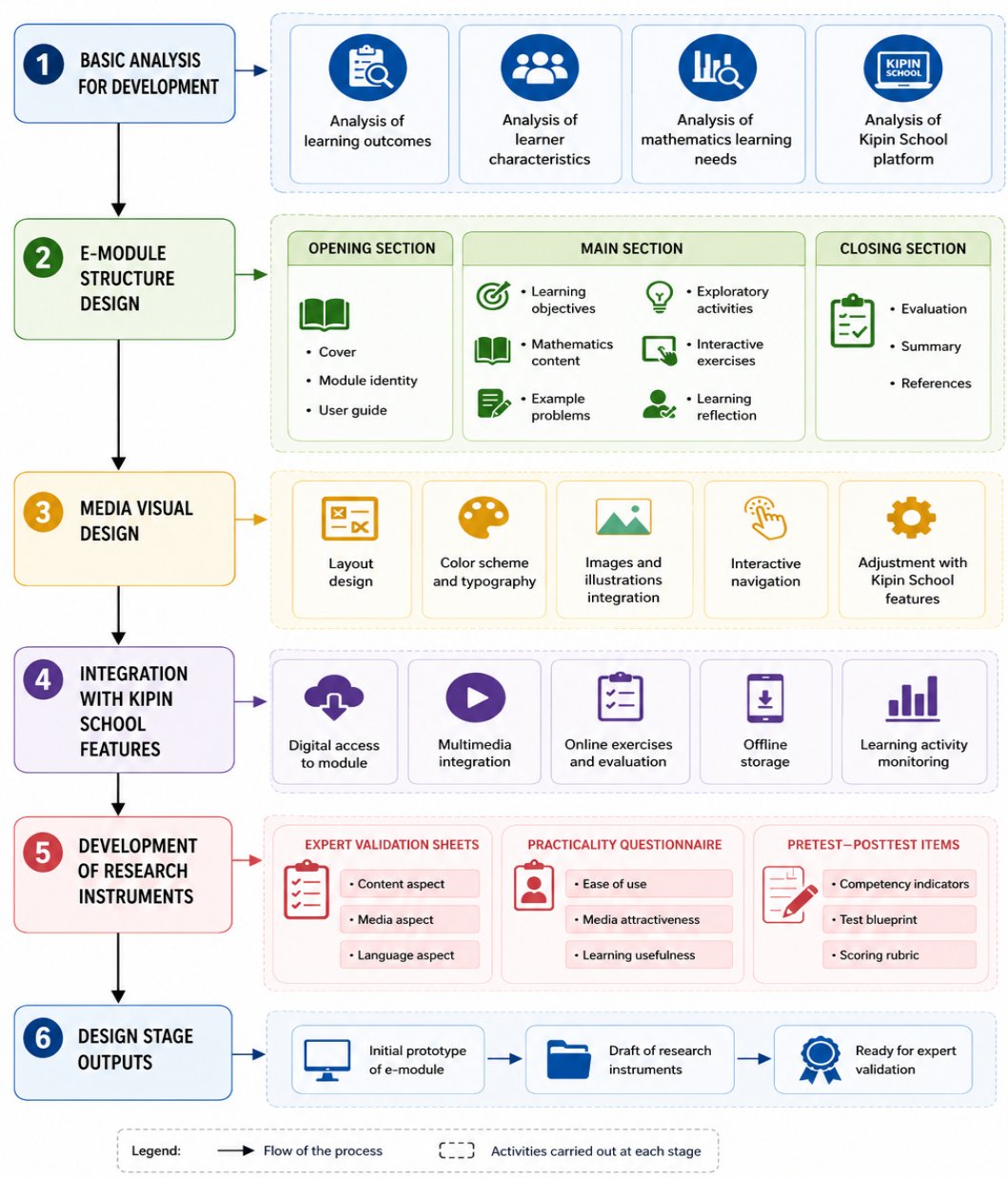

Figure 2. Flowchart of Designing a Product
Source: Author's Documentation

Based on **Figure 2**, the design process was carried out to ensure that the module aligns with the curriculum, has a sound pedagogical structure, and is user-friendly for elementary school students.

Results of the Development of the Kipin School-Based Mathematics Module

In development studies, the quality of the resulting product is measured using three main indicators: validity, practicality, and effectiveness (Almubarak & Saadi, 2022). In this section, the research findings first focus on the module's validity as a basis for assessing the product's suitability for use in actual learning settings. Validation is a crucial stage in

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development research as it aims to ensure that the developed product meets standards for content, design, and language, thereby making it suitable for use as a learning medium (Adeoye et al., 2024). This validation process uses a 1-10 scoring scale for each aspect evaluated. The results of the initial validation test of the module's design are presented in **Table 1**.

Table 1. Results of the Preliminary Validation Test of the Module Design

No	Validation Aspect	Score	Category	Recommendations
1	Learning Objectives	7.25	Valid	The learning objectives are generally appropriate, but further refinement is needed regarding the alignment of indicators and the formulation of objectives
2	Learning Materials	6.75	Valid	The material is sufficiently relevant, but it needs more depth. completeness of content, and systematic presentation
3	Learning Strategies	8	Highly Valid	The learning strategies are systematic, coherent, and consistent with the pedagogical flow.
4	Media Selection	7	Valid	The media is considered appropriate, but could be improved in terms of function optimization and variety
5	Selection of Learning Resources	6	Sufficiently Valid	Learning resources are still limited and require additional supporting references.
6	Evaluation/Assessment	7	Valid	The evaluation system is quite good, but it needs to be strengthened in terms of the scope of competency assessment
7	Enrichment and Remedial Plans	7	Valid	Enrichment and remedial plans are already in place, but more detailed differentiation is needed.

Source: Author's Documentation

Based on the results of the preliminary validity test in **Table 1**, the module design still required some improvements, particularly in content selection and the appropriateness of the learning resources used. These improvements were made to ensure that the presented content is more relevant to the learning outcomes and the characteristics of elementary school students, and to support a more contextual and easily understandable Mathematics learning process. Additionally, the learning resources were adapted to ensure a strong connection to the module's content and to enrich students' learning experiences through digital media from Kipin School.

The feedback from the validators was then used to revise the module design during the development phase. After the revision process was completed, the module was further developed and assessed for its suitability, quality, and effectiveness in supporting improvements in student learning outcomes. During the development phase, the validation process was conducted by three groups of experts: subject matter experts, media experts, and language experts, to ensure that the quality of the product could be comprehensively

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assessed from academic, technical, and communicative perspectives. The results of the module development validity test are visualized in **Figure 3**.

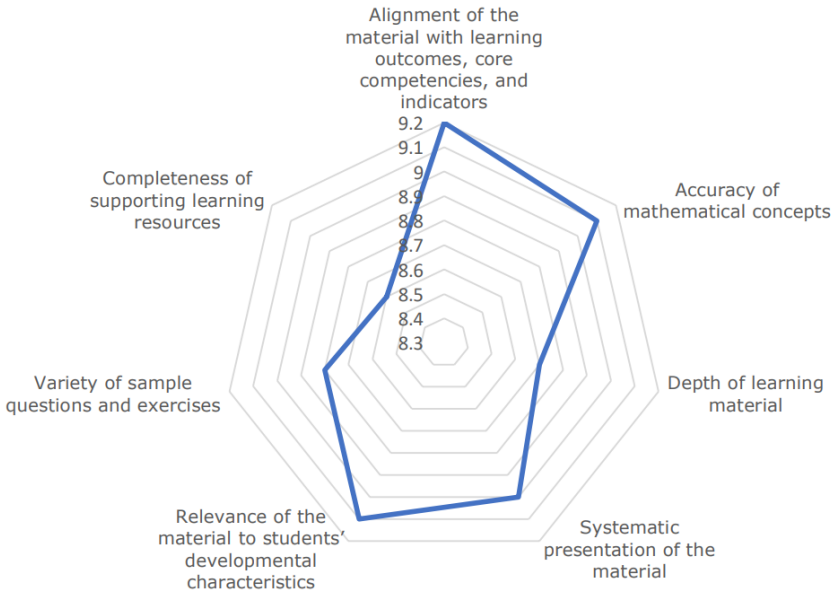

Figure 3. Graph of Content Expert Validity Results
Source: Author's Documentation

Figure 3 shows the results of the validity assessment of the Kipin School-based Mathematics learning module using a radar chart. In general, all aspects received high scores ranging from 8.5 to 9.2, indicating that the module falls into the "*highly valid*" category. The aspects with the highest scores were the alignment of the material with learning outcomes, core competencies, and indicators, and its relevance to students' developmental characteristics. Meanwhile, the completeness of supporting learning resources and the depth of the learning material received relatively lower scores than other aspects, indicating areas that need improvement in the module revision process before the implementation stage.

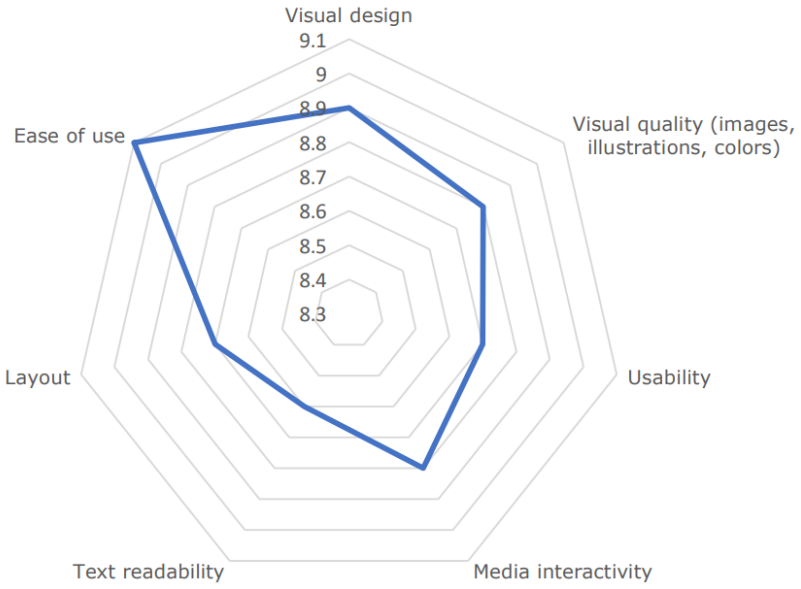

Figure 4. Graph of Media Expert Validity Results
Source: Author's Documentation

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Figure 4 presents the results of the validity assessment of the Kipin School module media, focusing on appearance and design, using a radar chart. In general, all indicators received high scores ranging from 8.5 to 9.1, indicating that the media falls into the "*highly valid*" category and is suitable for use in learning. The aspect with the highest score was ease of use, indicating that the media is easy for both students and teachers to operate. In addition, the visual design and visual quality of the media, such as images, illustrations, and colors, also received good ratings, thereby supporting the appeal of the learning experience. Meanwhile, the aspects of text readability and layout received relatively lower scores than other indicators, so they still require refinement to make the media's appearance more optimal and easier to use in the Mathematics learning process in elementary schools.

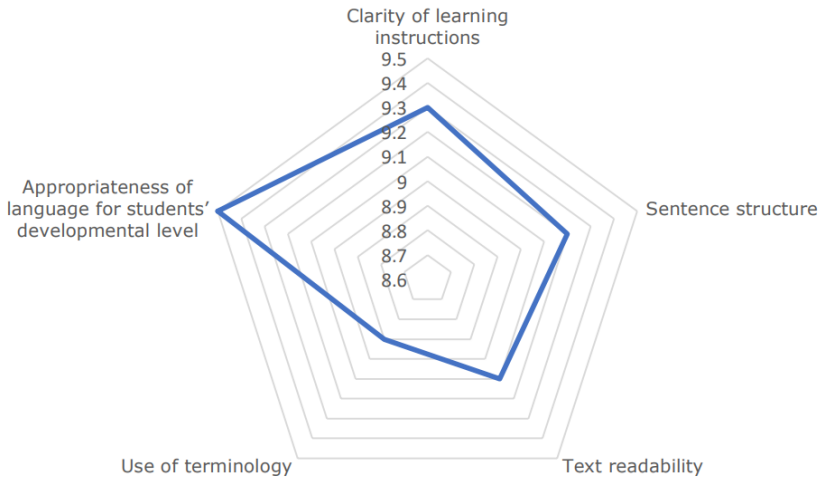

Figure 5. Graph of Linguistic Expert Validity Results
Source: Author's Documentation

Figure 5 presents the results of the validity assessment of the Kipin School module for the language aspect, using a radar chart. In general, all indicators received high scores ranging from 8.8 to 9.4, indicating that the module's language aspect falls into the "*highly valid*" category. The aspect with the highest score was the language's appropriateness for students' developmental level, indicating that the language used in the module is well-suited to the characteristics and cognitive abilities of elementary school students. In addition, the clarity of learning instructions also received a very good rating, helping students understand the steps of learning activities independently. Meanwhile, the aspects of terminology use and text readability received relatively lower scores than other indicators, indicating that they still require refinement to make the language simpler, more communicative, and easier for fourth-grade elementary school students to understand.

Table 2. Product Validation Results

No	Validation Aspect	Assessment Indicator	Percentage (%)	Category	Recommendations for Improvement
1	Subject Matter Expert	Alignment of content with the curriculum, conceptual accuracy, depth of content, systematic presentation,	90%	Highly Valid	Addition of content depth and learning resources

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No	Validation Aspect	Assessment Indicator	Percentage (%)	Category	Recommendations for Improvement
		relevance to student characteristics			
2	Media Expert	Visualdesign, visual quality, navigation, interactivity, readability, layout, ease of use	88%	Highly Valid	Optimization of font size and layout consistency across pages
3	Language Expert	Clarity of instructions, sentence structure, readability, use of terminology, and language appropriateness for students' developmental level	92%	Highly Valid	Simplification of some technical terms to better suit students' literacy level
Total Average		Cumulative total of all validation aspects	90%	Highly Valid	Suitable for implementation in the learning phase

Source: Author's Documentation

The validation results in **Table 2** show that the developed module received a "*highly valid*" rating across all evaluation aspects. The subject matter expert validation achieved a score of 90%, indicating that the module's content aligns with the curriculum and students' learning needs. Media expert validation achieved an 88% score, indicating that the module has good visual design and navigation structure. Meanwhile, language expert validation reached 92%, indicating that the language used in the module is communicative, clear, and appropriate for students' comprehension levels. Overall, the average validation score of 90% places the module in the "*highly valid*" category and deems it suitable for implementation.

Although the materials were rated as highly valid, the development process also involved revising the products based on feedback from the validators. The revisions included adding more depth to the content and learning resources, adjusting font sizes to improve readability, refining the layout across pages for greater consistency, and simplifying certain technical terms to better align with the literacy skills of elementary school students. These revisions demonstrate that the development stage is not merely a media production process but also a continuous improvement process aimed at optimally enhancing product quality.

Results on the Practicality of Product Use

Student Responses

The results regarding the practicality of the product's use were obtained through an analysis of teacher and student responses following the use of the Kipin School-based learning module in fourth-grade elementary school Mathematics instruction. The product's practicality indicates the extent to which the developed media is easy to use, engaging, aids the learning process, and effectively supports the achievement of learning objectives. Data collection was conducted using teacher and student response questionnaires covering aspects of media usability, the feasibility of the learning process, the clarity of the material, student

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engagement, and the media's benefits in aiding the understanding of mathematical concepts. The results are visualized in the following **Figure 6**.

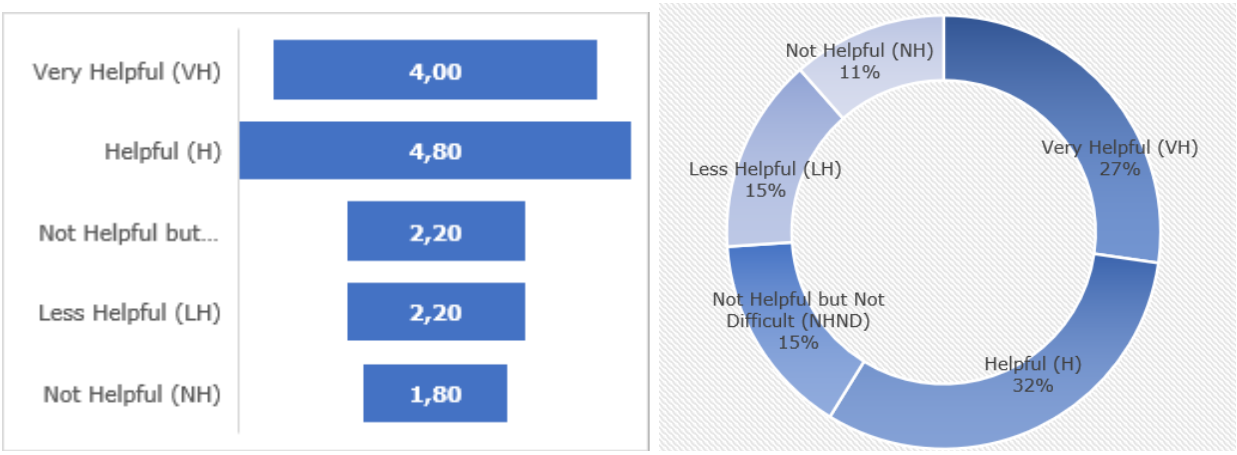

Figure 6. Students' Responses to the Use of Media
Source: Author's Documentation

Based on the results in Figure 6, the developed medium had a positive impact on the Mathematics learning process of fourth-grade elementary school students. The analysis was conducted on 10 students who answered 15 items on a subjective rating scale questionnaire with five rating categories: Very Helpful (SM), Helpful (M), Not Helpful but Not Difficult (TMTS), Somewhat Helpful (KM), and Not Helpful (TM). Data analysis showed that the Helpful (H) category received the highest percentage (32%), with an average score of 4.80. This finding indicates that most students felt that using the Kipin School media helped them understand fraction concepts, including numerators and denominators, fraction types, equivalent fractions, and fraction operations. Students also felt supported by the use of worksheets, the presentation of real-life problem examples, and the discussion and presentation activities included in the learning modules.

The "*Very Helpful*" (SM) category received 27% of the vote, with an average score of 4.00. This percentage indicates that a significant number of students felt that the use of Kipin School-based learning media was highly beneficial. Based on the survey items, these positive responses were evident in the use of fraction symbols and images at the beginning of the lesson, which helped students recall prior material and identify basic fraction concepts. Additionally, learning activities such as solving contextual problems, group discussions, and presenting work results were also assessed as helping students understand the material more deeply and increasing their confidence in expressing their opinions. This indicates that the media not only supports students' cognitive development but also enhances their active engagement and interaction during the learning process.

The "*Not Helpful but Not Difficult*" (TMTS) category accounted for 15% of the responses, with an average score of 2.20. These results indicate that some students felt the media used did not fully provide optimal support for understanding the material; however, the media remained easy to use and did not cause difficulties in the learning process. This situation was likely influenced by differences in students' prior ability to understand mathematical concepts or their level of adaptation to digital learning media. Next, the "*Less Helpful*" (KM) category received 15% of the vote with an average score of 2.20, while the "*Not Helpful*" (TM) category

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received the lowest percentage at 11% with a score of 1.80. The relatively small percentages in these two categories indicate that only a small portion of students felt the media was not yet able to provide maximum assistance to their learning process. Based on the survey indicators, students' positive responses were particularly evident in the use of real-life examples, group discussions, presentation activities, and worksheets, which helped them understand the concept of fractions more concretely and in context.

Additionally, the use of the Kipin School platform was found to create a more engaging and interactive learning environment, thereby increasing students' motivation to participate in Mathematics lessons. Learning delivered through digital media offers a more varied experience than conventional learning, making students more active and helping them grasp the material more easily. The results of this analysis indicate that students' responses to the Kipin School-based learning modules are positive. This is evidenced by the combined percentage of responses in the "*Helpful*" (32%) and "Very Helpful" (27%) categories, bringing the total positive response rate to 59%. Thus, the Kipin School-based learning media developed can be deemed practical and suitable for use in fourth-grade elementary school Mathematics instruction because it helps students understand the material, increases engagement, and creates a more meaningful learning experience.

Teacher Responses

Teachers' responses regarding the use of the Kipin School-based learning module were obtained through a questionnaire administered after a Mathematics lesson on fractions in the fifth grade of elementary school. The teacher response questionnaire was used to assess the media's practicality in supporting the learning process, including classroom management, lesson delivery, teacher-student interaction, and mastery of the subject matter. A study was conducted by five teachers on 27 questions related to the use of the learning media. The data from the teachers' responses were then analyzed to determine the extent to which the developed media helped teachers conduct Mathematics instruction effectively, engagingly, and in a manner appropriate to the characteristics of elementary school students.

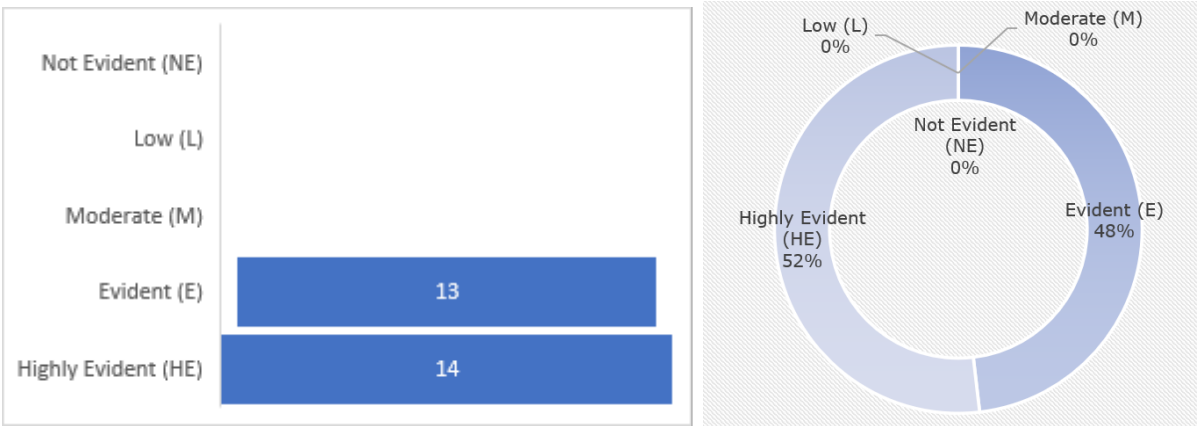

Figure 7. Teachers' Responses to the Use of Media
Source: Author's Documentation

Based on the results in **Figure 7**, the developed media is highly effective in supporting the Mathematics learning process in fourth-grade elementary school classrooms. The analysis

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was conducted on 27 questionnaire items completed by 5 teachers. Data processing results show that, across all assessed items, teachers, on average, responded in the "*Visible*" (T) category for 13 questions and the "*Very Visible*" (ST) category for 14 questions. These findings indicate that all aspects of the media's use received positive responses from teachers, with no ratings in the "*Not Visible*," "*Low*," or "*Moderate*" categories. Responses to the "*Perceived Effectiveness*" category across 13 questions indicate that the Kipin School module media have demonstrably helped teachers in their teaching practices. These aspects include the media's ability to capture students' attention, assist teachers in structuring lessons, facilitate the use of worksheets and teaching modules, support group discussion activities, and help teachers conduct lessons systematically in accordance with learning objectives.

Teachers also found that using media increased student engagement during learning, making the learning environment more active and interactive. The "*Very Apparent*" category, which appeared in 14 survey items, indicates that most media-use indicators were rated highly effective and strongly supportive of the Mathematics learning process. Based on the survey instrument, the aspects that received "*Very Apparent*" responses were related to the media's ability to assist in presenting fraction material, help students understand the concept of equivalent fractions and perform arithmetic operations with fractions, increase student participation in learning, and help teachers better manage classroom interactions. In addition, teachers assessed that the Kipin School media helped students build self-confidence, increase motivation to learn, and solve mathematical problems related to daily life more easily.

The high number of responses in the "*Visible*" and "*Very Visible*" categories indicates that the learning materials developed are not only easy for teachers to use but also effectively support the learning process. Teachers feel that the Kipin School media-assisted modules make it easier to deliver content, organize learning activities, and create a more engaging and enjoyable learning environment for students. Additionally, the use of digital media helps teachers integrate learning technology into students' learning activities in a more modern and contextual way. The data analysis indicates that the Kipin School-based module received a very positive response from teachers. Of the 27 questions administered to 5 teachers, all indicators received ratings in the positive category, specifically 48.1% in the "*Visible*" category and 51.9% in the "*Very Visible*" category. Thus, it can be concluded that the developed media are highly practical, easy to implement in instruction, and capable of supporting the effectiveness of Mathematics learning in elementary schools.

Results of the Evaluation of the Effectiveness Of Media Use

The effectiveness of the Kipin School-based learning module was analyzed using students' learning outcomes from participating in a fifth-grade elementary school Mathematics learning process on fractions. Effectiveness was measured by comparing pretest and posttest results to assess improvements in students' abilities following use of the developed learning module. Subsequently, descriptive analysis, a normality test, and a t-test were conducted on students' learning outcomes before and after using the learning module. The calculations were performed using IBM SPSS Statistics, and the results are shown in **Table 3**.

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Table 3. Results of the Descriptive Test of Student Learning Outcomes

			Statistic	Std. Error
Sebelum penggunaan media Kipin School	Mean		14.3793	.78221
	95% Confidence Interval for Mean	Lower Bound	12.7770	
		Upper Bound	15.9816	
	5% Trimmed Mean		14.5326	
	Median		15.0000	
	Variance		17.744	
	Std. Deviation		4.21234	
	Minimum		6.00	
	Maximum		20.00	
	Range		14.00	
	Interquartile Range		6.50	
	Skewness		-.566	.434
	Kurtosis		-.762	.845
Setelah penggunaan media Kipin School	Mean		21.6207	.67942
	95% Confidence Interval for Mean	Lower Bound	20.2290	
		Upper Bound	23.0124	
	5% Trimmed Mean		21.7835	
	Median		23.0000	
	Variance		13.387	
	Std. Deviation		3.65878	
	Minimum		13.00	
	Maximum		27.00	
	Range		14.00	
	Interquartile Range		5.00	
	Skewness		-.721	.434
	Kurtosis		-.294	.845

Source: Author's Documentation

Based on the results of the descriptive analysis in **Table 3**, the data after using the Kipin School media showed a mean score of 21.62, with a minimum score of 13 and a maximum score of 27, as well as a standard deviation of 3.659, indicating variation in student scores after using the media, though still within a relatively reasonable range. Meanwhile, the data prior to the use of the Kipin School media had a mean of 14.38, a minimum of 6, and a maximum of 20, and a standard deviation of 4.21, indicating a similar distribution but with a tendency toward lower values. The differences in the mean, maximum, and minimum scores before and after the use of this media indicate improved student learning outcomes.

Table 4. Results of the Data Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Sesudah penggunaan Kipin School	.164	29	.044	.936	29	.079
Data sebelum penggunaan Kipin School	.103	29	.200*	.958	29	.300

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: Author's Documentation

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Based on the results of the normality test for pretest and posttest data in **Table 4,** the Shapiro-Wilk test was used because the sample size was less than 50 (n = 29). The results showed that the data before the use of the Kipin School media (Pretest) had a significance value of 0.300 (> 0.05), indicating that the data were normally distributed. Meanwhile, the data after the use of the Kipin School media (posttest) showed a Kolmogorov-Smirnov significance value of 0.079 (> 0.05), indicating that the data were normally distributed. Thus, both the pretest and posttest data are normally distributed. The t-test used to assess differences in student learning outcomes before and after the use of the Kipin School Media began with the formulation of hypotheses: Ho, assuming no difference in student learning outcomes before and after the use of the Media, and H1, assuming a difference in student learning outcomes before and after the use of the Media. The results of the t-test are presented in **Table 5** below.

Table 5. T-Test Result

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Sebelum penggunaan media Kipin School - Setelah penggunaan media Kipin School	-7.24138	4.16323	.77309	-8.82499	-5.65777	-9.367	28	.000

Source: Author's Documentation

Based on the results of the paired t-test (Paired Samples Test) in **Table 5**, a mean difference of −7.24138 was obtained, indicating an increase in students' learning outcomes following the use of the Kipin School media. The calculated t-value of −9.367 with degrees of freedom (df) = 28 and a significance level (Sig. 2-tailed) of 0.000 (< 0.05) indicates that the difference between the scores before and after the use of the Kipin School media is statistically significant. Furthermore, the 95% confidence interval ranges from −8.82499 to −5.65777, which does not cross the zero line, thereby further strengthening the evidence of a real difference. Thus, it can be concluded that the use of the Kipin School media has a significant effect on improving student learning outcomes.

Table 6. N-Gain Calculation Results

	N	Minimum	Maximum	Mean	Std. Deviation
NGain_Score	29	.00	.17	.0834	.04552
NGain_Persen	29	.00	17.20	8.3375	4.55218
Valid N (listwise)	29				

Source: Author's Documentation

Based on the descriptive statistics for N-Gain shown in **Table 6**, 29 students were included in the analysis. The N-Gain Score values range from 0.00 to 0.17, with a mean of 0.0834 and a standard deviation of 0.04552, indicating a low level of improvement in student learning outcomes and a relatively narrow data distribution. Meanwhile, N-Gain expressed as a percentage (NGain_Persen) has a lowest value of 0.00%, a highest value of 17.20%, with a mean of 8.3375% and a standard deviation of 4.55218, indicating that, in general,

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the improvement in student learning outcomes after the use of the media remains in the low category. However, there is variation in improvement among students.

Discussion

Validity of the Development of Kipin School Educational Materials

The research results indicate that the Kipin School-based Mathematics module was rated as highly valid in terms of content, media, and language. These findings suggest that the developed media have met the principle of instructional alignment, namely, the integration of learning objectives, content, learning activities, and the assessment system to support the achievement of student competencies optimally (Hailkari et al., 2022). This integration is a crucial component of digital learning design because effective media must create a coherent connection between learning objectives and students' learning experiences. The high validity in the content aspect indicates that the module's content aligns with learning outcomes, the developmental characteristics of elementary school students, and the learning needs for Mathematics in the fractions unit. In elementary school Mathematics education, the alignment of content with students' cognitive development levels is crucial because students are still in the concrete operational stage and thus require visual and contextual representations to understand abstract mathematical concepts (Cirneanu & Moldoveanu, 2024).

Therefore, the development of material that is systematic, gradual, and supported by appropriate visualizations is a key factor in creating effective Mathematics instruction. The high validity in the media aspect indicates that the Kipin School platform effectively integrates visual, interactive, and navigational elements of learning, thereby supporting a more engaging and student-centered learning experience. The use of interactive digital learning media has been shown to increase student engagement in Mathematics learning by presenting multimodal materials, including images, animations, interactive exercises, and contextual activities (Yulianti et al., 2025). In this study, the integration of e-modules, digital exercises, and Kipin School-based learning activities enabled students to be more actively involved in the learning process than in conventional learning. These findings align with research indicating that interactive digital Mathematics media can improve the quality of learning because the material is easier to understand and presented more systematically (Mayadesti et al., 2025).

Additionally, the use of flexible digital platforms also provides students with the opportunity to access learning materials independently, making the learning process more sustainable. In terms of language, the validation results indicate that the language used in the module is appropriate for elementary school students' developmental level. Communicative, simple, and easy-to-understand language is a crucial component of Mathematics learning, as language serves as a tool for building conceptual understanding and conveying instructional guidance. The use of overly abstract or complex terminology can make it difficult for students to grasp mathematical concepts fully. Therefore, simplifying technical terms and improving text readability based on validator feedback are crucial steps in refining the learning media. These findings support research indicating that digital learning media using communicative and contextual language can enhance elementary school students' understanding of

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mathematical concepts more effectively than media that are textual and formal (Putri et al., 2025).

Although the validation results indicate that the categories are highly valid, several suggestions for improvement from the validators (such as adding depth to the content, varying learning resources, ensuring layout consistency, and optimizing readability) demonstrate that the development of digital learning media is a dynamic and ongoing process. Digital media development should not merely emphasize technological aspects but must also consider students' pedagogical needs and the quality of the resulting learning experience (Haleem et al., 2022). These findings reinforce the view that the development of digital learning media should be understood as an iterative process requiring continuous evaluation and refinement, rather than merely a one-time media production activity. Furthermore, the validity of digital learning media is also influenced by the media's ability to harmoniously integrate pedagogical, technological, and communicative aspects, thereby supporting more meaningful learning that aligns with the characteristics of elementary school students. Thus, the Kipin School-based Mathematics module can be regarded as a suitable digital learning medium to support more interactive, contextual, and effective elementary school Mathematics learning.

Level of Practicality in the Use of Kipin School Media

The results of the study indicate that the Kipin School-based Mathematics learning media achieved an excellent level of practicality, as evidenced by the positive responses from teachers and students during the learning process. This high level of practicality indicates that the developed media is easy to use, engaging, and effective in supporting classroom learning. In the context of digital learning, the practicality of media is crucial, as effective media must not only be academically valid but also easy for users to implement in real-world learning situations (Haleem et al., 2022). Students' positive responses to the use of Kipin School indicate that interactive digital media can enhance student engagement in Mathematics learning by presenting material that is more visual, contextual, and multimodal. The use of images, interactive exercises, digital worksheets, and discussion activities within the learning platform has proven to help students understand fraction concepts in a more concrete and meaningful way (Cirneanu & Moldoveanu, 2024).

These findings reinforce previous research showing that interactive digital media can enhance motivation to learn and active participation among elementary school students in Mathematics learning (Yulianti et al., 2025). The high level of positive student feedback also indicates that the Kipin School platform can create a learning experience that is more student-centered than conventional learning. Students do not merely receive material passively but also engage in exploratory activities such as group discussions, contextual problem-solving, and presentations of their work. Digital learning that enables students to interact with learning materials actively has been shown to enhance self-confidence, motivation to learn, and conceptual understanding of Mathematics among elementary school students (Khairunnisa et al., 2025). Furthermore, the flexibility of access to digital media allows students to learn more independently at their own pace, making the learning process more adaptive to individual student needs (Damayanti et al., 2024).

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This indicates that the practicality of digital learning media is not only related to technical ease of use but also to the media's ability to foster active, meaningful learning experiences. From the teachers' perspective, the research findings indicate that the Kipin School platform helps make the management of Mathematics instruction more systematic, engaging, and effective. Teachers noted that the use of digital media simplifies content delivery, enhances classroom interaction, and helps students stay more focused during lessons. These findings align with research indicating that interactive digital Mathematics media can help teachers integrate learning activities, assessments, and learning resources into a more organized learning system (Mayadesti et al., 2025). Additionally, the use of digital platforms helps teachers implement more varied learning by integrating practice problems, collaborative activities, and digitally based assessments, ensuring that Mathematics learning is not monotonous and is more contextual. Thus, the practicality of the Kipin School platform is evident not only in the ease of using the technology but also in its ability to support the effectiveness of Mathematics learning strategies in elementary schools.

Although the research results indicate a very high level of practicality, some students still rated the materials as "not very helpful" or "not helpful." These findings indicate that the implementation of digital learning media is still influenced by other factors, such as students' prior knowledge, digital literacy levels, readiness for independent learning, and adaptation to using technology in learning. Therefore, the use of digital media in Mathematics learning requires optimal teacher guidance and adaptive learning strategies that meet students' needs. Pedagogically, the findings of this study indicate that the practicality of digital learning media is closely related to the quality of learning interactions created during the learning process. Practical digital media is not merely easy to operate but also capable of creating more interactive, contextual, flexible, and student-centered Mathematics learning, thereby supporting improvements in the quality of learning in elementary schools.

The Effectiveness of Using the Kipin School Platform on Student Learning Outcomes

The results of the study indicate that the use of Kipin School-based learning media has a significant impact on improving elementary school students' Mathematics learning outcomes. This is demonstrated by statistically significant differences in pretest and posttest scores following the implementation of the media in Mathematics instruction on the topic of fractions. These findings suggest that digital media designed to meet students' pedagogical needs can more effectively support the development of conceptual understanding in Mathematics. In elementary school Mathematics education, digital media plays a crucial role in helping students understand abstract concepts through visual representations, interactive activities, motivation, critical thinking, and self-confidence (Fatmaningrum & Jazuli, 2025; Hidayani & Hakim, 2026; Kirana & Meilana, 2025; Shabrina & Fatayan, 2025). The use of the Kipin School platform enables students to learn through e-modules, digital practice exercises, group discussions, and problem-solving activities, which encourage active student engagement during instruction. This reinforces the view that effective Mathematics learning depends not only on the delivery of content but also on the quality of learning experiences fostered by interactive, student-centered learning media (Haleem et al., 2022).

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The improvement in learning outcomes observed in this study also indicates that the Kipin School platform can support instructional alignment among learning objectives, learning activities, instructional media, and assessment. This integration enables students to have a more systematic and meaningful learning experience, thereby helping them gradually grasp the concept of fractions. Digital media-based Mathematics learning, integrated with contextual activities, has been shown to enhance mathematical thinking skills, problem-solving abilities, and student engagement (Khairunnisa et al., 2025). Additionally, the use of interactive digital media helps students receive feedback on their learning more quickly through digital exercises and assessments, making the learning process more adaptive to students' needs (Damayanti et al., 2024). These findings align with previous research showing that the use of digital Mathematics e-modules can improve student learning outcomes because the material is presented systematically, visually, and in a way that is easy to understand, in line with the developmental characteristics of elementary school students (Mayadesti et al., 2025; Putri et al., 2025).

Although the t-test results indicate a significant improvement in learning outcomes, the N-Gain analysis results in this study still fall into the low category. These findings suggest that learning outcomes have not yet reached optimal levels, despite the positive impact of digital media on the learning process. The low N-Gain scores are likely influenced by several factors, such as the limited duration of media implementation, students' varying initial abilities, their level of adaptation to digital learning, and the still-limited intensity of media use. In elementary school Mathematics education, improving conceptual understanding requires a continuous process, as students need time to gradually build connections among mathematical concepts (Al Alawi et al., 2026). Furthermore, the effectiveness of digital media is significantly influenced by the quality of teacher guidance, the learning strategies employed, and students' ability to use technology in the learning process.

Therefore, the use of digital media in Mathematics instruction needs to be integrated more consistently and sustainably to optimize its impact on learning outcomes. From a pedagogical perspective, the results of this study indicate that the Kipin School platform has great potential to support the transformation of elementary school Mathematics instruction toward a more modern, interactive, and student-centered approach. Effective digital learning media are not merely tools that improve students' academic scores, but also tools that create meaningful learning experiences, enhance motivation, and foster active student engagement throughout the learning process. These findings reinforce the view that integrating digital technology into Mathematics education can be a relevant pedagogical strategy for improving the quality of elementary education in the digital age (Haleem et al., 2022). Thus, the Kipin School platform can be viewed as a digital learning medium that not only improves students' Mathematics learning outcomes but also supports more contextual, flexible, and aligned Mathematics learning that is aligned with the characteristics of 21st-century learners.

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CONCLUSION

This study concludes that the Kipin School digital media-based Mathematics module, developed using the ADDIE model, demonstrates excellent validity, practicality, and effectiveness as an innovation in elementary school Mathematics instruction on fractions. The high validation results indicate that the module meets feasibility standards for content, media, and language. In contrast, positive responses from teachers and students indicate that the media is easy to use, engaging, and capable of fostering more interactive, contextual, and student-centered learning. The effectiveness test results also show a significant improvement in student learning outcomes after using the Kipin School media, although the N-Gain score remains in the low category; thus, the implementation of the media requires further optimization through more adaptive, intensive, and sustainable learning strategies. Thus, Kipin School has strong potential as a digital learning platform to support the transformation of Mathematics education in elementary schools toward a more modern and meaningful learning experience. Further research is recommended to test the effectiveness of the platform on a broader sample, across different grade levels, and with other Mathematics topics, while integrating a more varied range of digital pedagogical approaches, so that the impact of the platform's use on improving students' learning outcomes and mathematical thinking skills can be analyzed more deeply and comprehensively.

AUTHOR'S NOTE

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