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DESIGN AND DEVELOPMENT OF ROBLOX-BASED CRAFTEDU BLOX FOR CONSTRUCTING AND DECOMPOSING CUBE STRUCTURES

Ahmad Rijal Hakim Fathulloh[1*], Nuriana Rachmani Dewi[2]

[1,2] Universitas Negeri Semarang, Semarang, Jawa Tengah, Indonesia
** Corresponding author. Universitas Negeri Semarang, Gunungpati, 50229, Semarang, Indonesia*

E-mail: ahmadrijal01@students.unnes.ac.id [1*]
nurianaramadan@mail.unnes.ac.id [2]

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ABSTRACT
Mathematics learning on cube geometry in elementary schools still faces challenges, particularly in students' conceptual understanding and spatial visualization abilities. These challenges are influenced by the limited use of learning media that primarily rely on two-dimensional representations, restricting opportunities for conceptual exploration. This study aimed to (1) design Roblox-based CraftEdu Blox digital learning media for teaching the construction and decomposition of cube structures and (2) determine the validity and feasibility of the developed media through expert evaluation. The study employed a Research and Development (R&D) approach using the ADDIE model limited to the analysis, design, and development stages. The participants were 54 sixth-grade students at SD Negeri Palebon 03. Data were collected through observations, interviews, initial ability tests, and expert validation instruments. The results indicated that CraftEdu Blox was successfully developed as a three-dimensional virtual learning environment that supports conceptual exploration through direct interaction with geometric objects, structured navigation, and interactive learning and assessment features. Expert validation results showed feasibility percentages of 94.00% for language, 95.38% for material, and 93.85% for media aspects, all categorized as highly feasible. These findings indicate that Roblox-based CraftEdu Blox is highly suitable for elementary mathematics learning and has the potential to support students' conceptual understanding and spatial visualization in constructing and decomposing cube structures.
Keywords: roblox-based learning media; cube geometry; spatial visualization; elementary mathematics

ABSTRAK
Pembelajaran matematika pada materi geometri kubus di sekolah dasar masih menghadapi berbagai tantangan, terutama pada pemahaman konsep dan kemampuan visualisasi spasial siswa. Tantangan tersebut dipengaruhi oleh keterbatasan penggunaan media pembelajaran yang masih didominasi representasi dua dimensi sehingga membatasi kesempatan siswa untuk melakukan eksplorasi konsep secara mendalam. Penelitian ini bertujuan untuk (1) merancang media pembelajaran digital CraftEdu Blox berbasis Roblox pada materi mengonstruksi dan mengurai bangun kubus serta (2) mengetahui validitas dan kelayakan media yang dikembangkan melalui penilaian para ahli. Penelitian ini menggunakan pendekatan Research and Development (R&D) dengan model ADDIE yang dibatasi pada tahap analisis, desain, dan pengembangan. Subjek penelitian terdiri atas 54 siswa kelas VI SD Negeri Palebon 03. Pengumpulan data dilakukan melalui observasi, wawancara, tes kemampuan awal, dan instrumen validasi ahli. Hasil penelitian menunjukkan bahwa CraftEdu Blox berhasil dikembangkan sebagai lingkungan belajar virtual tiga dimensi yang mendukung eksplorasi konsep melalui interaksi langsung dengan objek geometri, navigasi yang terstruktur, serta fitur pembelajaran dan evaluasi yang interaktif. Hasil validasi ahli menunjukkan persentase kelayakan sebesar 94,00% pada aspek bahasa, 95,38% pada aspek materi, dan 93,85% pada aspek media, yang seluruhnya berada dalam kategori sangat layak. Temuan ini menunjukkan bahwa CraftEdu Blox berbasis Roblox sangat layak digunakan dalam pembelajaran matematika sekolah dasar dan berpotensi mendukung pemahaman konsep serta kemampuan visualisasi spasial siswa pada materi mengonstruksi dan mengurai bangun kubus.
***Kata kunci**: media pembelajaran berbasis Roblox; bangun ruang kubus; visualisasi spasial; matematika sekolah dasar*

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Introduction

Mathematics learning in elementary school is essentially directed toward developing meaningful conceptual understanding as a foundation for students' success in learning mathematics at higher levels of education (Safari & Rahmalia, 2024). Conceptual understanding is not limited to students' ability to recall definitions or formulas but includes their ability to restate concepts in their own words, connect concepts systematically, and apply them in various contexts. The National Council of Teachers of Mathematics emphasizes that conceptual understanding represents a fundamental standard in mathematics learning that must be developed from the elementary level as part of essential mathematical competence (NCTM in Amelia et al., 2026).

Mathematical conceptual understanding is reflected through several cognitive indicators, including the ability to restate concepts, classify objects based on characteristics, identify examples and nonexamples appropriately, and relate concepts systematically (Sengkey et al., 2023). Students are also expected to apply concepts flexibly in problem-solving situations. These indicators align with the revised Bloom's taxonomy, which places understanding at a higher cognitive level than remembering (Khalishah et al., 2021). Therefore, strengthening conceptual understanding at the elementary level is essential in mathematics learning.

Within the national curriculum framework, the importance of geometry mastery is emphasized in Phase C Learning Outcomes, which require students to construct and decompose three-dimensional shapes, particularly cubes and rectangular prisms, identify spatial visualizations from multiple perspectives, compare geometric characteristics, and determine locations using grid-based maps (Kemendikdasmen, 2024). These competencies indicate that spatial visualization and three-dimensional composition skills represent essential components of foundational geometry literacy.

In elementary geometry learning, particularly in constructing and decomposing cube structures, conceptual understanding is closely related to spatial visualization and reasoning abilities. Students' understanding is reflected not only in identifying geometric elements but also in explaining structural formation processes and decomposing shapes into simpler components (Siyam et al., 2024). Spatial reasoning significantly contributes to students' mathematical performance, especially in geometry and measurement domains (Nasruloh, 2025; Xu et al., 2025). However, previous studies indicate that students' conceptual understanding of three-dimensional geometry remains relatively low. Students often experience difficulties in understanding relationships between dimensions and spatial representations (Putra & Pratama, 2023). This condition is partly caused by instructional practices that still emphasize memorization rather than conceptual exploration through manipulation and visualization activities (Andhika, 2025). International assessment results also show that Indonesian students' mathematical literacy remains below the international average, with a PISA 2022 score of 366 compared to the international average of 472 (Fathulloh & Sari, 2025).

Similar conditions were identified at SDN Palebon 03 Semarang through observations and interviews conducted on January 26, 2026. The results showed that students still experienced difficulties in restating concepts, identifying examples and nonexamples, and representing concepts visually. Learning media

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used in classrooms were still dominated by simple concrete materials and two-dimensional projected images, which had not sufficiently supported three-dimensional spatial visualization, particularly in cube construction and decomposition activities.

Initial ability test results also indicated that only 22 out of 54 students achieved the minimum mastery criterion (75), with an average score of 61.75. These findings indicate that students' conceptual understanding of cube geometry remains relatively low. Therefore, the development of interactive three-dimensional digital learning media is necessary to support conceptual exploration through direct manipulation within virtual environments (Muzayaroh, 2023).

Previous studies have highlighted the importance of spatial visualization and conceptual understanding in geometry learning and have explored the use of digital media to support these abilities. However, most existing studies focus on conventional digital applications, augmented reality, or general virtual learning environments. Limited research has specifically developed Roblox-based learning media for elementary mathematics, particularly for constructing and decomposing cube structures. In addition, previous studies have rarely integrated direct object manipulation, three-dimensional exploration, and concept construction activities within a game-based virtual environment. Therefore, this study addresses this gap by developing CraftEdu Blox, a Roblox-based learning media designed to facilitate conceptual understanding and spatial visualization through interactive cube construction and decomposition activities.

The contribution of this study differs from previous studies that generally examined digital learning media or game-based learning environments in a broader context. This study specifically developed a Roblox-based learning environment for constructing and decomposing cube structures, enabling students to directly manipulate three-dimensional objects within a virtual space. Therefore, the novelty of CraftEdu Blox lies in the integration of spatial visualization, virtual object construction, and geometry learning activities within a single interactive learning environment designed for elementary school students.

Based on these considerations, this study aims to design and develop Roblox-based CraftEdu Blox digital learning media for constructing and decomposing cube structures, as Roblox provides an interactive three-dimensional virtual environment that enables students to directly manipulate, assemble, and decompose geometric objects in a more concrete and visual way. Through these interactive activities, students are expected to better understand the relationships among cube structures and develop spatial visualization skills in learning geometry concepts. In addition, this study aims to determine the validity and feasibility level of the developed media for elementary mathematics learning. The novelty of this study lies in the development of CraftEdu Blox, a Roblox-based three-dimensional learning environment specifically designed for elementary students to learn cube construction and decomposition through direct virtual manipulation, structured exploration, and interactive assessment features.

Research Methods

This study employed a Research and Development (R&D) approach aimed at designing and developing a digital learning media product and evaluating its feasibility before broader implementation (Rahayu, 2025). According to Sugiyono (2023), R&D is a research method used to produce a specific product and examine

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its feasibility through systematic development procedures. The study adopted the ADDIE development model, consisting of Analysis, Design, Development, Implementation, and Evaluation stages. The ADDIE model was selected because it provides a systematic, logical, and flexible framework for instructional product development while enabling continuous evaluation throughout the development process (Azizah et al., 2022; Moses Adeleke Adeoye et al., 2024). However, this study was limited to the Development stage because its primary objective was to develop the Roblox-based CraftEdu Blox learning media and determine its validity and feasibility through expert evaluation before classroom implementation.

The study was conducted at SD Negeri Palebon 03 Semarang during the 2025/2026 academic year. The research subjects consisted of 54 sixth-grade students from classes VIA and VIB. These participants were involved during the needs analysis stage to identify learning difficulties and students' initial conceptual understanding related to constructing and decomposing cube structures.

The Analysis stage was conducted to identify instructional needs, learning conditions, and students' initial conceptual understanding. Data were collected through classroom observations, interviews with teachers and students, and an initial ability test. The observation sheet was used to examine learning activities, teaching methods, and the learning media employed in mathematics instruction. Interview guidelines were administered to obtain information regarding students' difficulties in understanding cube geometry concepts and teachers' instructional challenges. The initial ability test consisted of essay items developed based on indicators of conceptual understanding, including restating concepts, identifying examples and nonexamples, representing concepts visually, and applying procedures related to cube structures.

The Design stage focused on preparing the blueprint of the CraftEdu Blox learning media. Activities at this stage included organizing instructional content based on the Phase C Learning Outcomes, designing virtual exploration activities for constructing and decomposing cube structures, developing navigation systems and user interfaces, creating evaluation features, and preparing expert validation instruments. The media design was developed to support direct interaction with three-dimensional geometric objects within the Roblox virtual environment.

The Development stage involved producing the initial version of CraftEdu Blox and conducting expert validation. Product validation was carried out by three validators consisting of a material expert, a media expert, and a language expert. The material validation focused on content accuracy, curriculum alignment, and conceptual suitability. Media validation evaluated interface design, functionality, navigation, visual appearance, and usability. Language validation assessed readability, clarity, grammar, and appropriateness of instructional language. Feedback and suggestions from validators were used as the basis for revising and improving the developed media.

The research instruments consisted of observation sheets, interview guidelines, initial ability test instruments, and expert validation questionnaires. The validation questionnaires employed a five-point Likert scale ranging from very poor to very good. Instrument validation was conducted through expert judgment to ensure the appropriateness of assessment indicators before being used in the study.

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Data obtained from observations, interviews, and the initial ability test were analyzed descriptively to identify instructional needs and students' conceptual understanding problems. Expert validation data were analyzed using descriptive percentage analysis to determine the feasibility level of the developed media. The obtained percentages were then interpreted according to predetermined feasibility criteria, namely very feasible, feasible, moderately feasible, less feasible, and not feasible. Qualitative feedback provided by validators was analyzed descriptively and used as the basis for revising the CraftEdu Blox learning media. The overall stages of the research process are presented in Figure 1.

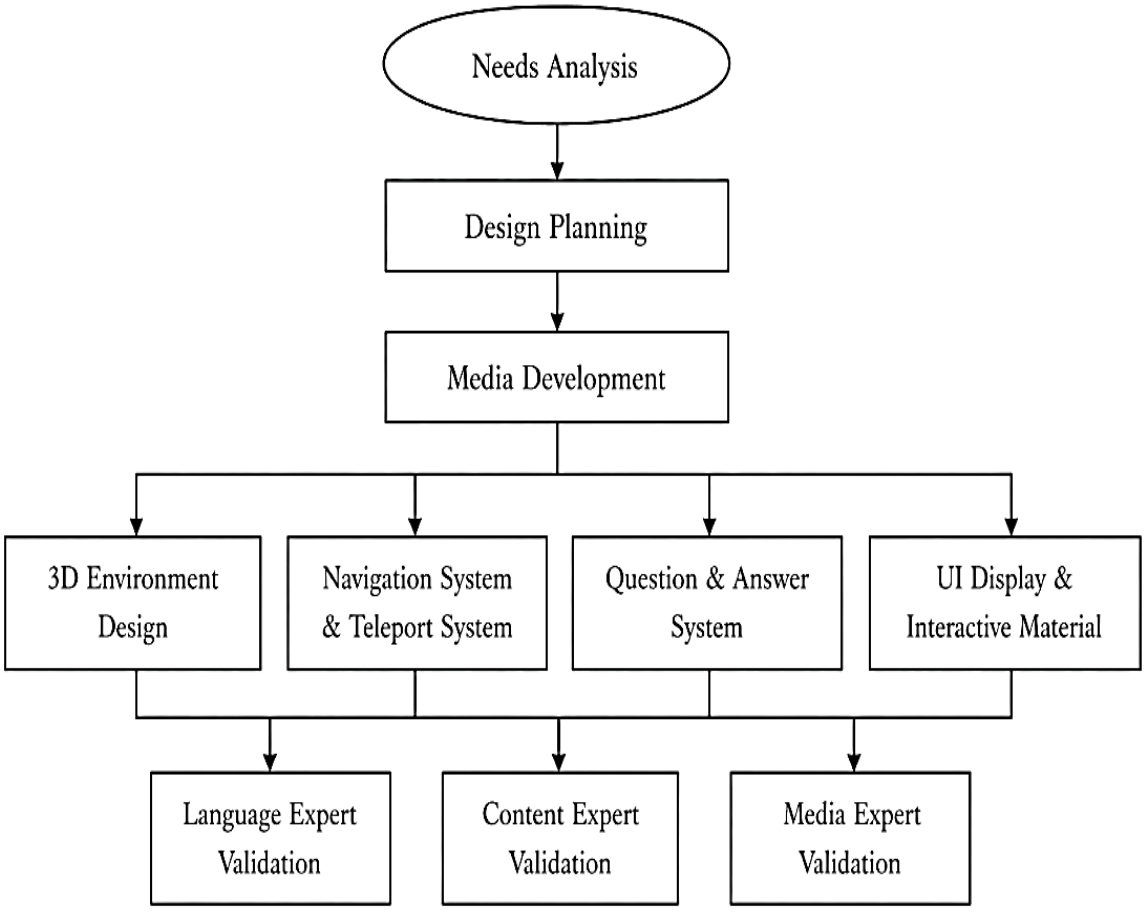

Figure 1. CraftEdu Blox Media Development Flow

Results and Discussion

Design of the CraftEdu Blox Learning Media

The results of the analysis stage indicated that students still experienced difficulties in conceptually understanding cube geometry, particularly in constructing and decomposing cube structures and in spatial visualization. In addition, students' ability to understand relationships among the components of three-dimensional objects and spatial arrangements had not yet developed optimally.

The findings also showed that the learning process relied only on simple concrete media and two-dimensional images. These media had not fully supported

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comprehensive exploration of three-dimensional structures, especially in cube construction and decomposition activities that require three-dimensional spatial visualization. Furthermore, the results of the initial ability test indicated that most students had not yet achieved the Minimum Learning Achievement Criteria. Of the 54 students who participated in the test, only 22 students achieved scores above the required criterion, with a class average of 61.75. These findings indicate that students' conceptual understanding of cube geometry still needs improvement through the development of learning media that facilitate more interactive visual representation and object manipulation as the basis for designing the CraftEdu Blox media in the subsequent stage.

The design stage was conducted based on the results of the learning needs analysis, which indicated the necessity of instructional media capable of facilitating more interactive spatial visual representation in constructing and decomposing cube structures. At this stage, a conceptual design of the CraftEdu Blox digital learning media was developed using a three-dimensional virtual environment to support elementary school students' conceptual understanding.

The media design process began with the preparation of instructional material structures aligned with the Phase C geometry learning outcomes, particularly competencies related to constructing and decomposing cube structures. The materials were arranged progressively, starting from the introduction of stacked structures, the construction of three-dimensional objects using unit cubes, the decomposition of three-dimensional structures into their components, and spatial visualization of cube structures. In addition to material presentation, learning activities in the CraftEdu Blox media allowed students to explore concepts through direct manipulation of three-dimensional objects within a virtual environment adapted to elementary school student characteristics, including engaging three-dimensional visualization, simple navigation, and systematic usage instructions that enabled students to interact independently with the virtual learning environment. Moreover, validation instruments for material experts, media experts, and language experts were also designed as part of the product feasibility evaluation process at the development stage.

The final stage was the development stage. At this stage, the conceptual design was implemented into the CraftEdu Blox digital learning media product within a three-dimensional virtual environment using the Roblox platform. The use of technology in mathematics education is increasingly important as it facilitates students' understanding of abstract concepts through enhanced visualization and interactive learning experiences (Syakinnah et al., 2026). The development process included designing the virtual learning environment in Roblox Studio, developing interactive learning systems, and designing the user interface (UI) to support cube construction and decomposition activities.

The development process began with the creation of a three-dimensional virtual environment as an exploratory learning space for students. This process included designing the layout of the virtual learning environment, preparing the spatial structure of the learning areas, and developing visual details for each section according to the sequence of learning activities within the media. Each area was designed progressively based on the material structure so that students could follow learning activities systematically and sequentially, as presented in Figure 2.

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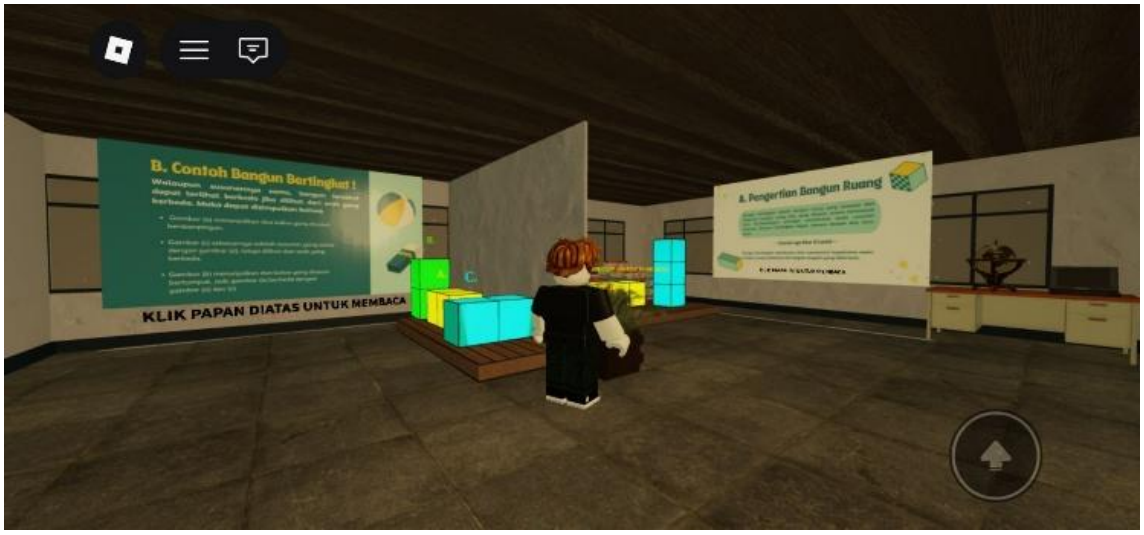

Figure 2. 3D Virtual Environment Design

After the virtual environment design was completed, the next stage involved developing the learning interaction system within the media. One of the systems developed was a teleport-based navigation system that connected learning areas sequentially so that students could move from one activity to the next according to the predefined learning sequence. In addition, a loading screen animation was developed as a transition feature between learning areas from the beginning to the end of the learning activities. This transition system was designed using the ScreenGui user interface integrated with navigation control scripts, as shown in Figure 3.

Figure 3. Teleport Navigation Interface toward the Loading Screen

The next development stage focused on the question display system using the ScreenGui feature, which was designed to present questions progressively according to the sequence of learning activities. The question display was supported by a typewriting animation to improve text readability and to regulate the presentation flow systematically based on the predefined activity sequence within the virtual environment. The question presentation system and the answer selection

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system were developed separately to ensure more flexible and structured user interaction management, as shown in Figure 4.

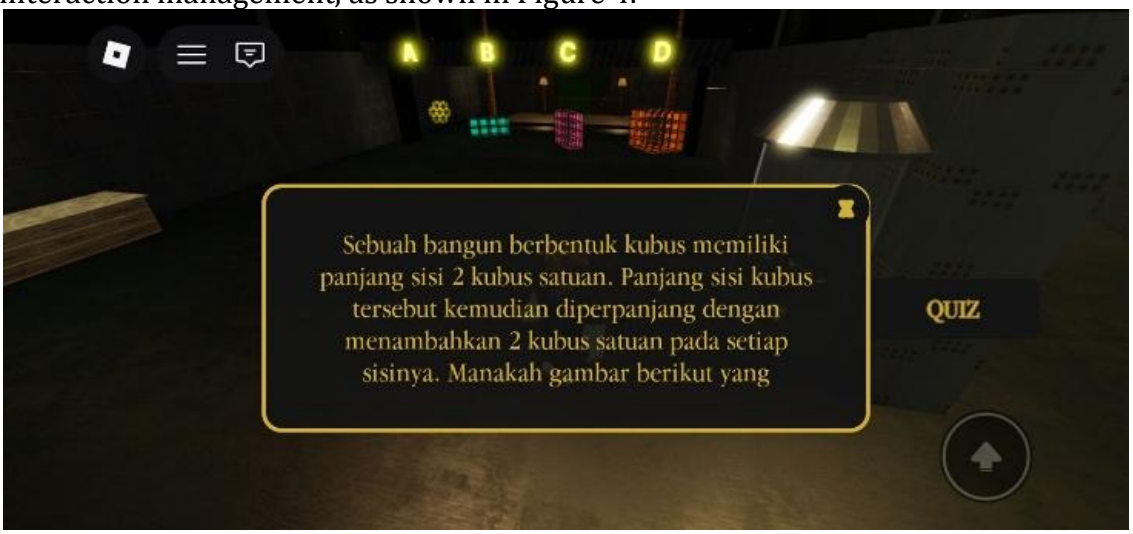

Figure 4. Question Display Interface Using the ScreenGui Feature

The main system of the learning media was designed to manage question activities and student responses. This system was developed using server-side programming to control the answer selection mechanism for multiple-choice questions. Each question item contained one correct answer among four predetermined answer options in the system. After students selected an answer, the system automatically locked the response so that it could not be changed. Student responses were then recorded through an integrated Discord webhook system that enabled centralized monitoring of scores through a server connected to the learning media, as shown in Figure 5.

Figure 5. Student Response Summary Interface

The CraftEdu Blox media were also equipped with an interactive instructional material presentation system using the ProximityPrompt feature, which enabled students to access learning materials directly through visual objects available in the virtual classroom environment. When students selected a material

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object, the system displayed instructional information on the screen so that the content could be read more clearly and systematically, as shown in Figure 6.

Figure 6. Learning Material Interface Using the ProximityPrompt Feature

All interactive systems in the CraftEdu Blox media were developed independently without using additional external extensions or plugins. Built-in platform plugins were used only to support the three-dimensional object design process, particularly in creating three-dimensional text elements and visual textures within the learning environment. The result of the development stage was a fully functional CraftEdu Blox digital learning media product that was ready for expert validation as part of the learning media feasibility evaluation process.

Learning Media Feasibility Validation

After completing the entire development process and producing the CraftEdu Blox learning media, the researcher conducted a feasibility validation stage through evaluations by language, material, and media experts. All validators were doctoral-level lecturers at Universitas Negeri Semarang with academic expertise relevant to their respective fields. The researcher used validation instruments that had previously undergone rater validation procedures and were therefore considered valid for assessing language aspects, material suitability, and media design quality. Each assessment aspect was operationalized into several indicators, including language accuracy, clarity of sentence structure, appropriateness of terminology according to students' developmental levels, alignment with learning outcomes, accuracy of geometry concepts, clarity of spatial visualization presentation, coherence of material organization, interface design quality, text readability, navigation consistency, and ease of user interaction with the media.

The language expert validator conducted the validation on April 9, 2026, by evaluating linguistic aspects, including spelling accuracy, sentence structure clarity, terminology comprehensibility, appropriateness of language style for elementary school students, and consistency in punctuation usage within the media. The results indicated that the media obtained a score of 49 out of a maximum score of 50, with a feasibility percentage of 94%. This percentage indicates that the CraftEdu Blox learning media met the "Highly Feasible" criterion in the language aspect. The

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validator suggested improvements focused on refining punctuation accuracy and ensuring consistency in language conventions to further optimize linguistic quality.

The material expert validator conducted the validation on April 13, 2026, by evaluating material suitability aspects, including alignment with Phase C geometry learning outcomes, accuracy of cube construction and decomposition concepts, correctness of spatial visualization representation, sequencing of material presentation, and integration between instructional content and learning activities within the media. The results showed that the media obtained a score of 62 out of a maximum score of 65, with a feasibility percentage of 95.38%. This percentage indicates that the CraftEdu Blox learning media met the "Highly Feasible" criterion in the material aspect. The validator suggested improvements focused on refining spatial visualization presentation to make geometric representations more systematic and easier for students to understand.

The media expert validator conducted the validation on April 15, 2026, by evaluating media quality aspects, including interface design, text readability, navigation consistency, clarity of icons and interactive buttons, quality of three-dimensional visual element integration, and ease of user interaction in operating the media. The results showed that the media obtained a score of 61 out of a maximum score of 65, with a feasibility percentage of 93.85%. This percentage indicates that the CraftEdu Blox learning media met the "Highly Feasible" criterion in the media design aspect. The validator suggested improvements focused on adjusting text size to further enhance information readability within the media interface. A summary of the validation results is presented in Table 1**.**

Table 1. Validation Results of the CraftEdu Blox Learning Media

Validator	Obtained Score	Maximum Score	Percentage	Feasibility Category
Language Expert	47	50	94%	Highly Feasible
Material Expert	62	65	95.38%	Highly Feasible
Media Expert	61	65	93.85%	Highly Feasible

Based on the evaluation results from the three validators in Table 1, the researcher concluded that the CraftEdu Blox digital learning media met the "Highly Feasible" criterion for implementation in elementary school mathematics learning on the topic of constructing and decomposing cube structures after revisions were made in accordance with the validators' recommendations. The high score obtained indicates that the developed media successfully aligned cube construction and decomposition activities with the expected learning outcomes. This result suggests that the integration of three-dimensional object manipulation within Roblox can facilitate more meaningful conceptual exploration than conventional visual representations.

Discussion

The results of this study indicate that the Roblox-based CraftEdu Blox learning media met the highly feasible criteria based on validation results from language, material, and media experts. This feasibility level demonstrates that three-dimensional virtual game-based digital learning media have strong potential to

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support geometry learning in elementary schools. This finding is consistent with the study of (Göksel & Kobak, 2023), which reported that the Roblox platform provides an interactive virtual learning environment that enhances creativity and develops thinking skills through immersive and constructive learning experiences. Other studies also indicate that the use of Roblox in learning improves students' positive attitudes toward the learning process while simultaneously supporting the development of cognitive and noncognitive abilities through interactive digital learning experiences (Han et al., 2023).

The feasibility results in the language aspect, which achieved a highly feasible category, indicate that sentence structure, spelling accuracy, and terminology consistency in the media met the standards of effective and communicative instructional language. Clear language in learning media represents an essential factor in supporting the successful delivery of abstract mathematical concepts, particularly in geometry topics. This finding aligns with the study of Faatin et al. (2026), which stated that digital technology in learning functions not only as a conceptual visualization tool but also as an instructional communication medium that increases student engagement through systematic and easily understandable information presentation. The use of digital game-based media has also been shown to improve students' literacy through engaging and contextual material presentation that facilitates gradual conceptual understanding of mathematics (Utami & Ilma Antawati, 2024).

The feasibility results in the material aspect, which also achieved a highly feasible category, indicate that the presentation of cube geometry concepts in the CraftEdu Blox media met the principles of alignment with learning outcomes, conceptual accuracy, material depth, and suitability with elementary school student characteristics. The presentation of learning materials through three-dimensional spatial visualization in a virtual environment enabled students to directly explore conceptual structures and strengthened their geometry conceptual understanding. This finding is consistent with Soliman et al. (2023), who reported that three-dimensional interactive game-based learning media help students understand geometry concepts more concretely. Similarly, Anjarwati & Wahyudi (2025) demonstrated that interactive visualization in three-dimensional geometry learning significantly improves students' spatial understanding and active engagement during the learning process.

The feasibility results in the interface and design aspects, which also achieved a highly feasible category, indicate that visual elements, navigation systems, animations, and interactivity in the CraftEdu Blox media were designed to optimally support students' learning experiences. Digital game-based learning environments enable students to actively engage through direct interaction with learning objects, making the learning process more meaningful and contextual. This finding is supported by Serrano-baena et al. (2025), who reported that game-based learning approaches create active and interactive learning experiences and increase student engagement in mathematics learning.

The CraftEdu Blox media were specifically designed to support indicators of students' mathematical conceptual understanding in constructing and decomposing cube structures. Interactive material features presented through three-dimensional visualization enabled students to understand relationships among cube structures

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more concretely through virtual object exploration before answering questions at each stage of the learning activities. In addition, the sequential navigation system supported students in understanding systematic problem-solving procedures through structured learning experiences within the interactive virtual environment. The use of three-dimensional visualization in geometry learning has been shown to improve mathematical representation ability and structural understanding of three-dimensional objects compared with conventional two-dimensional media (Fujita et al., 2025). Furthermore, the integration of game mechanics in digital learning has been shown to improve procedural skills and sustain student engagement in mathematical problem-solving activities (Amajida et al., 2025; Byun et al., 2024).

Despite the promising results, this study has several limitations. The development process was limited to the analysis, design, and development stages of the ADDIE model and did not proceed to large-scale implementation and effectiveness testing. In addition, the feasibility evaluation relied on expert judgment and therefore has not yet provided empirical evidence regarding the impact of CraftEdu Blox on students' learning outcomes and conceptual understanding. Future studies are recommended to conduct implementation and evaluation stages involving experimental designs to examine the effectiveness of the media in authentic classroom settings.

Overall, the development of the CraftEdu Blox media in this study demonstrates that the use of the Roblox platform as a digital learning environment can expand students' learning experiences from conventional instruction toward more flexible and exploratory virtual learning experiences. This finding indicates that metaverse-based digital learning media have strong potential to support the transformation of mathematics learning in elementary schools, particularly in geometry topics that require high spatial visualization ability (Azzahra et al., 2025). The use of Roblox as a virtual learning environment also enables the integration of collaborative, exploratory, and constructive learning activities within a single digital learning ecosystem (Jeong et al., 2024).

Conclusion and Suggestion

This study successfully designed and developed CraftEdu Blox, a Roblox-based digital learning media for teaching the construction and decomposition of cube structures in elementary school mathematics learning. The developed media was designed as a three-dimensional virtual learning environment that integrates interactive geometry exploration, structured learning materials, sequential navigation, and evaluation features to support students' conceptual understanding and spatial visualization. The feasibility evaluation results demonstrated that the developed media achieved a very high level of feasibility based on expert validation. The language aspect obtained a feasibility percentage of 94%, the material aspect obtained 95.38%, and the media aspect obtained 93.85%, all of which were categorized as highly feasible. These findings indicate that CraftEdu Blox meets the requirements for use as a learning medium in elementary mathematics, particularly for learning activities related to constructing and decomposing cube structures. Furthermore, the development of CraftEdu Blox contributes to the integration of Roblox as a three-dimensional virtual learning environment that provides opportunities for more interactive and exploratory geometry learning experiences.

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Since this study was limited to the development stage of the ADDIE model, future research is recommended to continue with the implementation and evaluation stages to examine the effectiveness of CraftEdu Blox in improving students' conceptual understanding and spatial visualization abilities. Further studies may also investigate students' learning motivation, engagement, and learning outcomes when using Roblox-based learning media in broader educational settings.

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