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Needs analysis for the development of interactive multimedia-assisted contextual learning model based on elementary school student characteristics

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Abstract

The study analyzes considerations and directions in choosing the best learning model and media to help students understand the subject. They can complete it based on the characteristics of students so that students can be directly involved during the implementation of learning. A teacher must be able to apply a teaching method appropriate to his pupil's condition because characteristics are unique properties inherent in a person or an object. Each child has different learning characteristics and abilities, so to make learning enjoyable and engaging, it should be relevant to students' daily lives and supported by interactive multimedia. The research method employed was qualitative-descriptive. Meanwhile, the research data was collected through interviews and questionnaires with the students. Research was carried out at three elementary schools in Padang City with 60 subjects. Based on the study identified characteristics of students, among them, students enjoy playing (96.7%), enjoy working with groups (83.3%), engaged in learning activities using interactive multimedia (81.13%), and experienced direct involvement (80%) in the practice or use of such multimedia that arouses student interest in the learning material. Thus, based on the characteristics of elementary school students, contextual learning models aided by multimedia interactive support were implemented to help the learning process.

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1. Introduction

Introduction Education has significantly contributed to the development and improvement of the quality of human resources. Every human has specific needs that must be met, and one of those needs is education because we cannot learn any knowledge in the world otherwise. Elementary school education is a component of formal education and the compulsory education program in Indonesia. Learning in elementary school focuses not only on student learning completion but also on strengthening student character. Learning in elementary school focuses not only on student learning perfection but also on emphasizing student character development.

Mathematics is a subject that is taught across all educational levels, including elementary, junior high, senior high, and university levels. Mathematical concepts are not limited to education; they are

also highly relevant to daily life; thus, mastery of this subject is crucial (Pebriana, 2017). Students have historically perceived mathematical subjects as difficult and unappealing, making them uninterested or lazy to learn them (Asriyanti and Purwati, 2020; Hapsari and Fahmi, 2021). Likewise, teachers experience difficulties teaching mathematics to students (Fauzi et al., 2020).

Everyday life and mathematics are generally interconnected. The contextual learning model is a learning approach that establishes a link between the subject matter and students' everyday lives. This model promotes the integration of acquired knowledge into students' everyday lives and aids teachers in relating subject matter to practical circumstances that students may encounter. Students' knowledge and abilities result from their diligent pursuit of acquiring new information and developing new skills during learning activities. Given that contextual learning encompasses cognitive, affective, and psychomotor domains, teachers are obligated to incorporate student characteristics into their instructional design. Furthermore, the development of learning media represents an imperative advancement in learning innovation alongside the implementation of learning models. Media utilization can potentially enhance the quality of learning (Abdussakir et al., 2022; Annisah, 2017; Anwar and Nurmina, 2019; Komala, 2017).

Learning media functions as a medium through which teachers convey knowledge to students while stimulating their emotions, interests, and thought processes during the learning process (Tafonao, 2018). Interactive multimedia has excellent potential to gather information and attract users (Ilmiani et al., 2020). Implementing interactive learning is designed to support teachers in realizing lesson plans, anticipating that students will quickly grasp the material (Kobayashi et al., 1996). Unlike traditional methods, it can eliminate the impression of monotony in the delivery of learning materials (Khairunnisa and Ilmi, 2020; Purba et al., 2022), can involve students' active participation in learning (Merdeka et al., 2022), and can provide meaningful learning experiences for students (Abdussakir et al., 2022). Consequently, it is possible to change the content to make it more interesting and easier to understand and make learning activities fun (Shalikhah, 2017). Interactive multimedia can be used as a substitute for traditional media in the classroom (Kresnadi and Pranata, 2020; Kurniawati and Nita, 2018). Moreover, interactive learning media helps teachers become more professional when using technology for teaching and learning (Utami et al., 2020).

For teaching and learning to be successful, teachers must be highly qualified and experienced. An aspect that teachers should prioritize is their capacity to select and implement learning models and media that are appropriate for the subject matter at hand and contribute to the development of students' attitudes toward their treatment. This is because students have different characteristics and development, particularly those at the elementary school level.

Teachers continue to employ traditional teaching methods, including lectures and question-and-answer sessions. Although students solely receive learning materials from the teacher, the teacher serves as the central figure in the learning process. Teachers continue to rely on book media, including student worksheets and supporting books, although elementary school students are highly active when playing. If students solely depend on these things, they will become more bored with learning. Moreover, although elementary school students enjoy hands-on activities, learning remains teacher-centered. Using media and models throughout the learning process can significantly influence student engagement and encourage them to learn more actively.

Hilman's research indicates that the Contextual Teaching and Learning approach substantially impacts learning outcomes (Ihsani and Prayitno, 2020). This approach can potentially enhance elementary school students' learning outcomes. Student learning outcomes may be enhanced through interactive multimedia (Aprianty et al., 2021). Numerous studies of scholarly have uncovered the advantages of multimedia-based learning. These include enhancing learning motivation (Leow and Neo, 2014; Made Rajendra and Made Sudana, 2018), facilitating students' comprehension of complex material (Wu and Tai, 2016), fostering comprehension of mathematical concepts (Aris et al., 2017; Novitasari, 2016), and ultimately enhancing the quality of the learning experience. Similarly, research conducted by Dewi, Ryan, C. et al. (2015) and Sugianto (2016) demonstrated that integrating multimedia technology into contextual learning can significantly enhance students' character

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development and mastery of concepts. Character development among students is influenced substantially and facilitated by the use of interactive learning media (Apriliani et al., 2021). Research conducted by Indah Septiani et al. (2020) demonstrated that interactive multimedia can effectively strengthen student character and is practical for learning.

By utilizing the results derived from this systematic literature review, it is expected that learning models and media can be developed that allow students to be directly involved during the implementation of learning based on the characteristics of elementary school students. Besides, this research can serve as a guide and point of reference when selecting the most effective learning model and media to facilitate students' understanding of the subject matter.

2. Literature Review

2.1 Contextual Learning Model

Contextual teaching and learning emphasize students' interests and experiences (Satriani et al., 2012). According to Type and Price (2001), the office of vocational and adult education performed a study that resulted in the following definition of Contextual Teaching and Learning (CTL) is a theory that encourages students to put in the hard work necessary for learning and helps teachers connect subject matter content to real-world situations. It also helps students make connections between knowledge and its applications to their lives as workers, family members, and citizens. Contextual learning is a concept that allows teachers to associate the subject contents with the situation in the real world and motivates students to make a connection between knowledge and implementation in their lives.

The goal of contextual learning is to provide students with more practical information and abilities so they can connect what they have learned in the past to what they will need in society. Pupils can find significance and worth in the learning procedures and the subject matter. Applying prior knowledge with new concepts to create new cognitive schemes is facilitated by connecting ideas and real-world scenarios. Knowledge acquisition and application to real-world circumstances foster the development of decision-making, creative thinking, and problem-solving abilities (Type and Price, 2001). The task of teachers in contextual learning is to guide students to their goals. Teachers deal more with strategy than information. Teachers manage a class as a team that works together to find something new for class members. The knowledge and skill from 'find yourself' are not from 'what the teacher says.'

Philosophically, this CTL approach refers to the philosophy of constructivism, a learning philosophy that emphasizes that learning not only memorizes but that learners must construct knowledge in their minds. Furthermore, that knowledge cannot be separated but reflects skills that can be applied. When using CTL, teachers should create the following seven concepts: (1) constructivism, (2) discovery/inquiry, (3) asking (questioning), (4) learning community, (5) modelling, (6) reflection, and (7) authentic assessment. REACT was developed by Crawford (2001) based on these CTL principles and applied in the United States (Ruhimat et al., 2012). A series of REACT teaching strategies (relating, experiencing, applying, cooperating, and transferring) encourage students' interests, confidence, and needs to understand. In contextual teaching strategies, relationships are the most critical component. It suggests that students' learning should be centred on their existing knowledge or life experience. A contextual approach seeks to make students active students (Misteni and Baehaqi, 2015). One could say that applying strategy means learning using what has been learned. Students can apply what they learn in problem-solving activities. Allowing students to work in groups with little external help is suggested so that they can handle more complex problems (Crawford, 2001). The last strategy is to transfer. Transfer is a teaching strategy that allows students to use knowledge in a new context. In this case, a situation or task must be authentic and not done in class.

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2.2 Interactive Multimedia

Interactive multimedia is one digital medium that can be used for educational purposes. According to Saputri and Indriayu (2018), interactive multimedia combines some media such as audio, image, text, animation, video, and games. It allows the students to engage with the device. In addition, Hadisaputra et al. (2019) discovered that using interactive multimedia in the learning process has increased learning outcomes, critical thinking skills, conceptual comprehension, and motivation. Because interactive multimedia offers so many benefits, educational institutions can employ it as one of their online learning resources. First, learning becomes more creative and dynamic when interactive multimedia is used. Multimedia interaction enhances learning by improving comprehension of the content being given. Pupils actively participate in their education (Evans and Gibbons, 2007). The second skill is integrating text, images, audio, music, animated visuals, or videos into a unit that works well together to accomplish learning objectives (Leow and Neo, 2014). It alters how students view learning materials as challenging, increasing their happiness and motivation to learn (Ampa, 2015).

Interactive multimedia can create more realistic learning environments, cater to students' different learning styles' needs, and produce engaging displays like animations to pique students' attention and motivate them. Learning is more successful when interactive multimedia is used in teaching (Rachmadtullah et al., 2018). Last, Students can better grasp the notion of civics by employing interactive multimedia learning. Displays and animations that assist students in visualizing abstract ideas and enhance learning to be more efficient are linked to interactive multimedia's capacity to improve comprehension of this concept (Nusir et al., 2013). Furthermore, interactive multimedia, including images, animations, photos, and videos, can support cognitive processes and enhance students' learning capacities (Made Rajendra and Made Sudana, 2018).

2.3 Student Characteristics

The nature or characteristics of elementary school students related to the child's growth and development are fundamental because children in primary school experience many physical and mental changes caused by internal and external factors. Children will grow better with a good environment, parental attention, and good lifestyle habits. Knowledge of basic school students' characteristics will support learning success as the child's intellectual development heavily depends on nutritional health, cohabitation, formation, and parents' motivation.

Considering that each student has unique characteristics and a different grip on the subject matter, it is possible that the delivery and presentation of the actual mathematical learning process abstract must be preceded by real practice before reaching the abstract concept. So, math defence tools will be invaluable in the learning process. An interesting and enjoyable classroom atmosphere can also encourage children to learn.

In the process of learning mathematics, the role of the learning media will significantly help the learning process. Further stated in the study by Widodo and Wahyudin (2018), one factor determining the success of learning mathematics is the learning media used. One of them is interactive multimedia. Abstract things can be presented in the form of models, where the models referred to here are concrete objects that can be seen, manipulated, and shaped so that students can easily understand them (Annisah, 2017). The presence of models in mathematics learning will trigger the emergence of the ability to associate mathematical ideas with a variety of topics or with everyday situations, or develop the ability of students to speak and communicate. A model (representation) of a mathematical problem or concept is an aspect that is always present in learning mathematics. Characteristics of students that can be identified as factors that influence learning processes and outcomes are intelligence, initial abilities, cognitive styles, learning styles and motivation, and socio-cultural factors. Information about the level of development of students' intelligence is essential as a guide in choosing learning components, such as learning objectives, materials, media, learning strategies, and evaluation.

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3. Method

The study employed a descriptive-qualitative method in which the researcher provided factual reports of relevant data regarding the application of learning in mathematics subjects in the fifth grade of elementary school. The research was conducted in three elementary schools: SDN 03 Alai Padang, SDN 06 Lapai Padang, and SDN 35 Pagambiran Padang. Sixty students were used as subjects for this study. The study was conducted to analyze and describe the process by which interactive multimedia facilitated the development of contextual learning models in elementary schools, with a focus on the characteristics of the students. Students were asked to fill out a questionnaire related to the statement of needs for developing contextual learning models assisted by interactive multimedia developed based on the characteristics of elementary school students. The data was analyzed using descriptive data analysis techniques and data triangulation.

4. Results and Discussion

Contextual learning is a pedagogical approach that enables teachers to establish connections between the subject matter delivered and real-world situations. This effort assists students in relating their acquired knowledge to practical situations. The success of the learning process can be enhanced through the utilization of learning media (Yatri and Pratiwi, 2018). To enhance students' motivation and enthusiasm, it is crucial to incorporate visually appealing materials for learning, such as interactive multimedia resources (Anjarsari et al., 2020). Therefore, teaching utilizing interactive multimedia-assisted contextual learning models should be tailored to the characteristics of elementary school students to maximize their engagement through participation in learning activities. Thus, the learning atmosphere will be more lively and help students improve their learning achievement (Nusir et al., 2013).

To facilitate enjoyable learning, the design of an interactive multimedia-assisted learning model should consider the characteristics of elementary school students. This study also looked at data from gender differences among students who participated in mathematics learning and who provided assessments. The quantitative data came from 51.7% male and 48.3% female students. It indicates that the number of those providing assessments and statements of need is balanced.

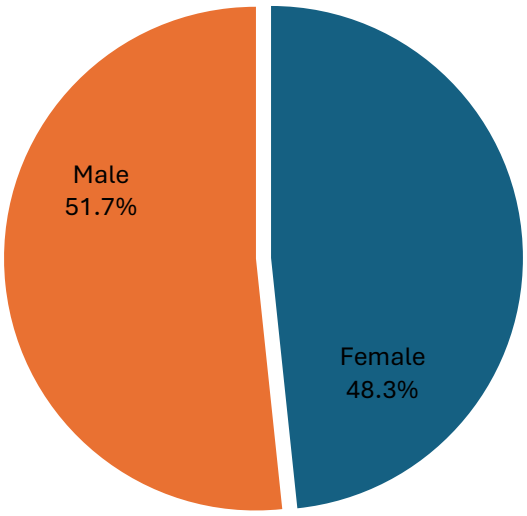

Figure 1. The percentage of students who filled in the quantitative data based on gender

A questionnaire was distributed to the students to assess their needs statement. The results of the questionnaire can be seen in the table below:

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Table 1. Needs analysis in developing an interactive multimedia-assisted contextual learning model based on the characteristics of elementary school students

No	Statement	Yes	No
1.	Absorb the material more quickly by listening to the teacher's explanation rather than reading it yourself.	96.7%	3.3%
2.	Prefer to learn by discussing with friends rather than studying alone.	83.3 %	16.7%
3.	Enjoy reading textbooks aloud and listening to them.	56.7%	43.3%
4.	It is more straightforward to grasp lessons through pictures, graphs, or charts than just the written word.	80%	20%
5.	Understand lessons better through videos and animations.	81.7 %	18.3%
6.	They prefer to read textbooks by themselves rather than getting them read to them.	13.3%	86.7%
7.	Understand lessons through practice.	80%	20%
8.	Like utilizing tools and media in learning.	81.7%	18.3%
9.	Enjoy games and sports.	96.7%	3.3%
10.	Favourite color	Various colours	

Figure 2 below also depicts the percentage of needs that can be met when developing interactive multimedia-assisted contextual learning models for elementary school students.

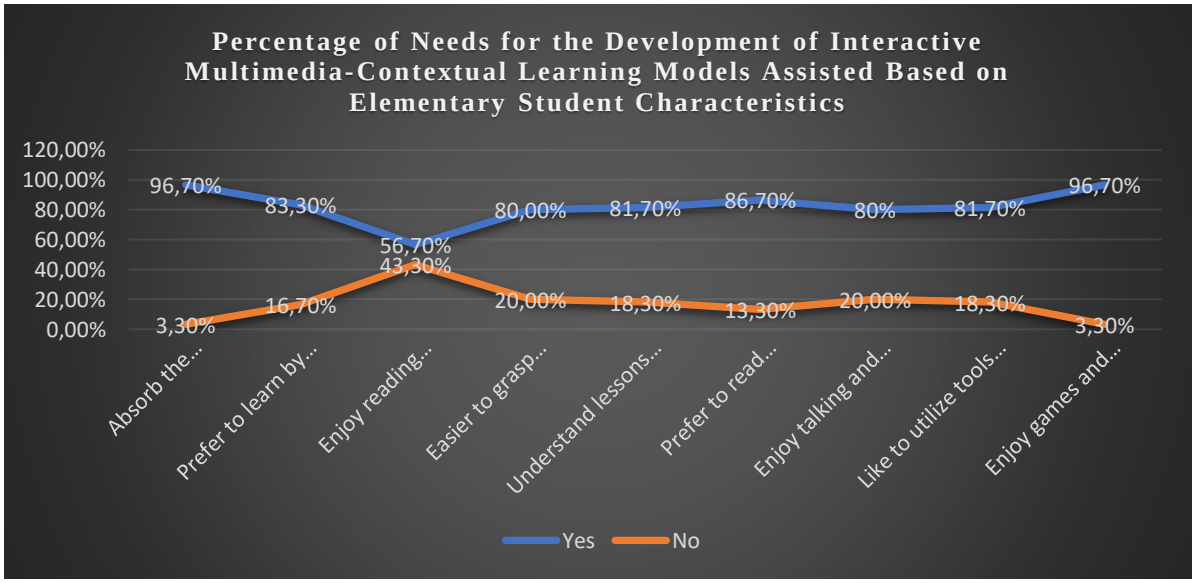

Figure 2. Percentage of needs for the development of interactive multimedia-assisted contextual learning models based on characteristics of elementary students

The data presented in the table indicates that approximately 96.7% of students absorb the learning materials faster by listening to the teacher's explanation rather than reading them themselves. Learning should prioritize student engagement beyond conventionally memorizing teacher-presented material. In this digital age, technology can reform education to support learning. As an educational innovation, the transformation of teacher-centred learning into a student-centred format must be realized. Teachers should be able to deliver materials in diverse ways, not limited to

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traditional lectures. A teacher must be able to vary the learning process (Azimi et al., 2017), and one of these adaptations is the use of creative learning models and media that suit the needs of their students.

A potential model to enhance the learning process is the contextual learning model, which establishes connections between the material covered and the student's real-life situations and aims to render the acquired knowledge more applicable and practical in their lives (Hidayati, 2012). Teachers can deliver relevant material more effortlessly through this interactive multimedia, infusing learning activities with enjoyment. Users may utilize the controllers on this interactive multimedia to select which options to view. As a result, interactive multimedia becomes a sophisticated and efficacious form of media with controls in the form of navigation buttons that allow interaction between the user and the application (Erwin, Vini Ariani., 2019; Nazalin and Muhtadi, 2016). Therefore, 56.7% of students enjoy listening to and reading textbooks aloud. Furthermore, 86.7% of students would read textbooks independently instead of having them read to them, which will be alleviated by interactive multimedia, combining text, audio, video, animation, and interactivity. Hence, through interactive multimedia to support the development of a contextual learning model, students can cultivate their curiosity and independence by actively participating in learning activities.

This interactive multimedia can be utilized in the classroom as a learning medium. According to the results, 81.7% of students prefer to learn with the aid of media and equipment, 80% find lessons easier to comprehend, and 81.3% comprehend lessons more effectively when animated graphs, charts, and videos are utilized instead of just writing. The combination of various media in the form of text, photos, graphics, sound, animation, video, and interaction that has been collected into a digital file (computerized) and used to convey messages to the public is called interactive multimedia (P. Manurung, 2021). To make learning more engaging, diverse, time-saving, and interactive, the contextual learning model, bolstered by interactive multimedia, may be implemented to construct knowledge and deliver feedback based on student-performed actions.

In other findings, 88.3% of students prefer to learn through peer discussion rather than studying alone, and 81.7% find it easier to understand lessons through practice. Students can learn and acquire practical experience through interactive multimedia contextually generated or incorporated into the learning environment. Students will be actively involved and interested in participating in the learning process. Additionally, students will find it easier to comprehend the features because the material is readily accessible and readily located in their surroundings. On the other hand, interactive multimedia facilitates hands-on learning for students by allowing them to interact with the media while concurrently engaging in the learning process. Therefore, developing a contextual learning model aided by interactive multimedia fosters effective group collaboration, resulting in more meaningful learning.

Additionally, it was discovered that 96.7% of students like games. Providing materials by incorporating real-life examples presented in interactive multimedia with educational games can affect students' interest and motivation in learning. Furthermore, games have become popular among elementary school students (Erwin, Vini Ariani., 2019). Simultaneously incorporating games and technology into the field of education has the potential to improve classroom-based learning activities, student engagement, and understanding (Niswati et al., 2020). Furthermore, including a colouring game in the learning materials that challenges participants to provide visually appealing designs creates a pleasurable and welcoming atmosphere for students. This is supported by the findings, which indicate that students offer various responses concerning their preferred colours. Aesthetically pleasing colour variations will enhance the learning experience. Learning is more likely to be successful when conducted in a joyful environment. Students will comprehend the lesson naturally when they are enjoying the learning process. Therefore, learning will be more meaningful when a contextual learning model is developed aided by interactive multimedia.

By integrating interactive multimedia into contextual learning models, teachers can foster independent student learning and increase student motivation to learn (S. R. Manurung and Panggabean, 2020; Nopriyanti and Sudira, 2015; Wuryanti and Kartowagiran, 2016) and create a more

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enjoyable learning environment. The content-related benefit of this interactive multimedia-assisted contextual learning model resides in how learning materials are presented and the content's suitability to student characteristics. Adjustments to student characteristics can make it easier for students to understand the material presented (Husein et al., 2017; Mawarni and Muhtadi, 2017). According to Yanti (2017) and Azzimi et al. (2017), interactive media containing content corresponding to student characteristics can enhance learning outcomes.

Student characteristics are among the most critical factors to be used as a reference in supporting learning objectives (Aghni, 2018; Satriawan, 2020). Any learning will be optimal if student characteristics are always considered because the suitability of these characteristics can make it easier for them to understand the lesson (Budiana et al., 2013; Hidayat et al., 2019; Patandung, 2017). Considering that each child has unique characteristics and various learning abilities, the delivery and presentation of the learning process should be related to the real-life situations students encounter daily. Additionally, a stimulating and enjoyable classroom environment can motivate students to learn.

According to a study by Dewi, Ryan, C., et al. (2015), implementing multimedia technology and contextual learning approaches impacts student character development. It is in line with the findings of the research, which suggest that contextual learning models can aid in developing students' curiosity, confidence, teamwork, independence, and hard work, among other qualities. Therefore, teachers must be able to effectively package the learning process for students and impart things that are present in the students' environment following the student's characteristics so that the material learned is not abstract and has greater significance for students. Additionally, students should be provided opportunities to engage in hands-on learning experiences independently and collaboratively.

5. Conclusion

Based on the results obtained, it can be inferred that when developing interactive multimedia-assisted contextual learning models in elementary schools, consideration must be given to the following attributes of elementary school students: students exhibit a high interest in engaging in play activities, Students demonstrate a strong inclination to participate in various learning activities actively, students tend to learn independently and possess a deep sense of curiosity, students prefer to work collaboratively to achieve common goals, and students show a preference for performing, demonstrating, or participating directly in the learning process. As a result, in this digital age, teachers must employ innovative learning models supported by technology to facilitate enjoyable and engaging learning experiences. Furthermore, by integrating contextualized materials and technological advancements, the learning experience for students can be enhanced, leading to increased motivation and improved learning outcomes.

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