



DEVELOPMENT OF SMART STUDENT LEARNING MEDIA IN IMPROVING STUDENT ABILITIES TO THINK CRITICALLY

Famelia Ariza, Misdalina, Marleni

Universitas PGRI Palembang

E-mail: famelia1428@gmail.com

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Corresponding Author:

Famelia Ariza

Email Corresponding:

famelia1428@gmail.com

ABSTRACT

The low interest that students have in mathematics classes is the driving force behind this research, which aims to increase students' engagement and comprehension of addition and subtraction concepts by employing smart ladder media. The purpose of this study is to use smart ladder media to increase the Hots Thinking Subject's capacity. SD Negeri 83 Palembang, situated on Jl. Pangeran Ratu Jakabaring, RT 29/ RW 08, 15 Ulu, Seberang Ulu I District, Palembang City, South Sumatra, is the location where this research was conducted. This study falls under the category of development research since it aims to identify Valid, Practical, and Potential Effects. 10 students from class II at SD Negeri 83 Palembang participated in this study; ten students took the practical test and twenty-seven students worked on the questionnaire. In this study, tests and questionnaires were used as data collection methods. The investigation yielded 89% of the results with the criterion "Very valid" across all validators. A practicality test, administered at SD Negeri 83 Palembang, yielded a 56% "Quite practical" proportion among the ten students who completed the questionnaires. At SD Negeri 83 Palembang, the possible impact of providing 10 essay test questions received an 82% "Very Effective" rating.

Keywords: Smart Ladder Media Improves Hots Thinking Subject Ability

1. INTRODUCTION

The education received at the primary school level is a major factor in determining the quality of schooling. School level education is heavily influenced by the quality of education received in elementary school. The absence of knowledge imparted to elementary school pupils will lead to their inability to comprehend the subject matter. The

degree to which students have succeeded in finishing their studies at the current educational level has fallen short of everyone's expectations. Thinking Subject is crucial for lower class pupils since they have trouble accepting the information that is taught to them. Teachers must therefore be able to recognize proper expectations in education and at school in their capacity as educators and teachers (Lestari, 2021, p. 26).

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Education is one of the important factors in supporting the progress of the nation because it is able to develop students' abilities in dealing with problems and finding solutions to the problems they face. In realizing this, the important role of teachers is needed who carries out the responsibility in educating students in schools. Teachers are not only obliged to convey knowledge. However, teachers also have a responsibility to help develop their students' potential. Teachers are encouraged to always be creative and skilled in managing all learning activities in the classroom so that they are fun and can foster enthusiasm among students following the lesson. However, in reality, teachers tend to teach using traditional methods or media so that the material is not conveyed well. For this reason, the development of teachers' teaching skills plays an important role in improving the quality, including Thinking Subject learning (Setiyadi and Cahyasari, 2023, p. 146).

One of the subjects taught in elementary school (SD) is Thinking Subject, which includes instruction concerning addition and subtraction computations. This demonstrates why studying Thinking Subjects is crucial since learning results will rise when students are highly engaged in their studies. Pupils with a strong desire to learn will be more industrious and driven to understand the instructional methods used in the teaching and learning process (Maningkum & Rohmaniyah, 2023, p. 167).

One of the challenges facing the educational process Thinking Subject learning is seen as one of the lessons that is dull and challenging for students to understand. Thinking Subject is the emergence of the notion that Thinking Subject in addition material is still a lesson in class. In order to address this issue and prevent pupils from becoming easily disinterested or frustrated in the classroom, unique and creative teaching methods must be used. In order to spark students' interest and drive in learning Thinking Subject, educators must use tangible models, techniques, and media that truly grab their attention.

This media is designed to resemble a three-dimensional ladder equipped with numbers to support the learning process. In its use, students They will be given sticks with pictures that they insert into the stairs. The sticks that are stuck will be taken according to the addition and subtraction problems being discussed. Smart ladder media has advantages, such as increasing student involvement so that they play an active role in learning, attracting attention, and allowing for a concrete approach (Binta & Ritonga, 2023, p. 597). This is in line with research by Vera Yuli Erviana and Muslimah with the title development of smart ladder learning media for addition and subtraction material for grade 1 elementary school. Smart ladder media has picture sticks as a counting medium. It aims to encourage students to participate actively in the learning

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process through the use of learning media. Study of the development of three-dimensional ladder-shaped media. Because elementary school age children are still in the concrete operational thinking phase, the teaching and learning process requires concrete media. The use of a game model as a three-dimensional learning media fulfills two characteristics of PMRI, students participate actively and there is a learning media (Erviana & Muslimah, 2018, p. 60).

To improve 21st century skills, according to the teachers, creating learning involves students' mathematical thinking abilities with nuances of higher order thinking skills (Yuliandini et al, 2019, p. 29) stated that high-level thinking skills (HOTS) need to be applied following the low ranking of the Program for International Student Assessment (PISA) and trends in International Mathematics and Science Study (TIMSS) when working on HOTS questions, so learning media are needed in the teaching and learning process. One of them uses student worksheets (LKPD). The LKPD used is the final product of HOTS-based LKPD development (Purwasi & Fitriyana, 2020, p. 66)

2. LITERATURE REVIEW

Understanding Learning Media

According to Anasi (2022), learning media serves as a bridge between educators and students, facilitating the transfer of knowledge,

skills, and attitudes through the development of favorable learning environments (p. 8).

Since communication is a process that involves learning as well, learning media can be defined as a collection of materials, tools, or software employed in the learning process and objectives. As a tool for spreading educational messages, learning media is crucial (Gunawan & Ritonga, 2019, p. 39).

Learning media as a tool in realizing the success of the teaching and learning process has a significant impact on teachers' success in teaching. Apart from creating a pleasant atmosphere for students, learning media also helps teachers convey material and allows students to receive it as feedback from the learning process. (Setiawan, 2022, p. 12).

Based on several expert opinions above, it can be concluded that Learning Media is an intermediary for learning materials to teachers and students through the learning process to convey learning messages using tools to realize the success of the teaching and learning process.

Benefits of Learning Media

Learning media generally helps teachers and students interact with each other, which results in more effective and productive learning activities. Specifically, some of the benefits of learning media are as follows:

- 1) Seeing past objects or events. By using pictures, photos, slides, films, videos, or

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- other types of media, students can gain a clear understanding of past objects or events.
- 2) Observe objects or events that are difficult to visit because they are far away, dangerous, or prohibited. For example, the condition and activities of dangerous animals in the forest. As an example.
 - 3) Gain a clear understanding of objects that cannot be observed directly because their size is too large or too small. For example, by using picture media, students can see monuments and amoeba clearly, and with video, they can see bacteria and amoeba clearly.
 - 4) Hearing sounds that are difficult to perceive directly, such as the sound of a heartbeat, and so on.
 - 5) Pay close attention to animals that are difficult to observe directly because they are difficult to catch. Students can see various types of insects, birds, bats, and so on with the help of pictures, photos, PowerPoint, and videos. Seeing things that rarely happen or are dangerous. Students can see rainbows, volcanic eruptions, lunar and solar eclipses, and tsunamis, using PowerPoint, films, or videos.
 - 6) Pay close attention to items that are easily damaged or difficult to preserve. Students can see human body organs such as the heart, lungs, digestive system, and so on using models or artificial objects.
 - 7) Compare things easily using pictures, models, or photos, students can easily compare the properties of two different objects in terms of size, color, and so on.
 - 8) Can see movements that occur quickly and slowly. With the help of videos, students can clearly see the techniques for kicking the ball and throwing the ball, which are presented slowly or stopped gradually.
 - 9) Using videos, students can easily observe car engine movements, etc., which are difficult to observe directly.
 - 10) See hidden parts of the tool. By using diagrams, charts, or models, students can see parts of the tool that are difficult to observe directly (Kristanto, 2016, p. 12).

Learning Media Objectives

In general, the objectives of learning media are as follows:

- 1) Make the delivery of the message less verbalistic
- 2) Solve problems of time, place and sensory abilities
- 3) Increase enthusiasm for learning and create stronger relationships between students and teachers (Sumiharsono & Hasanah, 2017, p. 4).

Advantages of Smart Ladder media

This media has several advantages, such as increasing student involvement in learning, attracting their attention, and providing concrete experiences. This makes

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Thinking Subject learning more interesting and interactive for students. Students can gain better understanding and skills of Thinking Subject through practical and hands-on experience. In addition, this smart ladder media uses images, animations, or graphics to visualize Thinking Subject concepts, which helps students understand difficult concepts better, especially for students who learn with a visual style. Visualization can increase students' understanding of Thinking Subject concepts and help them understand abstract concepts. (Novitasari et al, 2023, p. 1504)

Understanding Interest in Learning

Interest in learning is a desire or need that arises from participation and personal learning experiences that are created by a sense of security in the learning process so that the results of learning are completely controlled by students and teachers must be able to create a combination so that students always need and want to continue learning (Firmansyah, 2015, p. . 39).

Student interest in learning is a factor that originates from within humans and functions as a guide in carrying out activities that lead individuals towards conscious attention, interest, desire and experience, while the affective behavioral aspects of interest have characteristics in direction, intelligence and target (Rahmayanti, 2016, p. 209).

Obedient interest (Slameltol, 2010, p. 180) is a feeling of preference and a sense of attachment to a thing or activity, without anyone ordering it. Students who are interested in studying tend to be serious about studying, on the other hand, students who are less interested in studying tend not to follow the study process well. Interest in learning also certainly doesn't just grow like that, there are many factors that can influence students' interest in learning, for example motivation. Motivation is the motivation to stimulate, direct and maintain the behavior of the individual to act on something during learning until the learning goal is achieved.

Learning Interest Indicator

Indicators of student interest in learning can be seen from how students' attitudes/relationships are when studying (Kartika, Husni, & Millah, 2019, p. 120). According to Slameltol (2010, p. 180), there are several indicators of interest in learning, namely: feelings of enjoyment, interest, acceptance and student involvement. Based on the explanation above, it can be concluded that the indicators of interest in learning are, a feeling of liking/enjoyment in learning activities, a sense of interest in learning, awareness of learning without being asked, participating in learning activities, paying sufficient attention to learning.

Hot

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HOTS is a very important component in the educational process both at school and at college. All students at all levels of education must learn thinking skills which are an important component of critical and creative thinking skills, including HOTS(Suparman, 2021, p. 33).

HOTS is a student's thinking process at a higher cognitive level known as Higher Order Thinking Skills (HOTS). HOTS comes from various concepts, learning taxonomies, problem solving methods, Bloom's taxonomy, and assessment(Sofyan, 2019, p. 3).

HOTS (Higher order thinking skills) is a process of thinking of students at a cognitive level and is developed from various concepts. HOTS (Higher order thinking skills) includes the ability to solve problems, the ability to think, analyze, the ability to argue, and the ability to make decisions. HOTS (Higher order thinking skills)(Azam & Rokhimawan, 2020, p. 103).

HOTS is an important competency that every student must have. One of the achievements of HOTS learning is student learning activities that demonstrate learning with high-level thinking skills(Sulistiyani & Deviana, 2021, p. 305).

Based on several expert opinions, it can be concluded that Higher thinking order skills (HOTS) are a very important component in the student learning process for various concepts, learning taxonomies, problem

solving methods, Bloom's taxonomy, and assessment.

How to increase students' interest in learning

According to (Djamarah SB, 2011, p. 167) there are several ways that teachers can use to arouse students' interest in learning, namely:

1. Identifying the existence of a need in students, so that they are willing to learn without coercion.
2. Connect the teaching materials provided with the students' experiences, so that students can easily accept the learning materials.
3. Provide opportunities for students to obtain good learning outcomes by providing a creative and collaborative learning environment.
4. Using a variety of forms and teaching techniques in the collective development of individual students.

Understanding Thinking Subject

Thinking Subject is a field that investigates number calculations, quantities, geometry, and other topics. Because Thinking Subject helps humans solve various problems, everyone must understand and master Thinking Subject. This shows how important Thinking Subject is for human education. Student learning outcomes increase if their interest in learning increases. Students with a high interest in learning will be more diligent

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and motivated to study topics that interest them. Thinking Subject is one of the important lessons taught with the aim of improving and improving the quality of teaching in the teaching and learning process.(Balaweling et al, 2023, p. 9116)

Thinking Subject is one of the subject areas or areas of study taught in schools and teachers teach students about how symbols come from the real world or daily activities. Students must understand the concept of Thinking Subject before using these symbols. Thinking Subject is a tool and servant of other knowledge, both for theoretical purposes and in everyday life as an application(Asiah et al, 2022, p. 107).

Thinking Subject is one of the basic sciences that forms a tool for studying other sciences. For elementary school students, Thinking Subject is useful for developing their thinking patterns, understanding the world around them, and learning more(Allani et al, 2017, p. 2).

Thinking Subject is one of the subject areas taught in schools and teachers teach students about shapes and symbols used in daily activities or the real world.(Asiah et al, 2022, p. 107).

Based on several expert opinions, it can be concluded that Thinking Subject is the calculation of numbers and symbols derived from the real world and everyday life,

therefore it is very important to master Thinking Subject.

Characteristics of Thinking Subject

- 1) The spiral method in Thinking Subject learning shows the existence of a relationship between the material. Understanding the previous topic is necessary to understand the next topic or vice versa.
- 2) Thinking Subject learning is carried out in stages. Material is taught in stages, starting from the simplest concepts and moving up to more complex concepts.
- 3) Even though Thinking Subject is a deductive science, Thinking Subject learning in elementary school uses an inductive method based on students' development stages.
- 4) Thinking Subject learning adheres to the truth of consistency.
- 5) Thinking Subject learning must show that the Thinking Subject concept is not taught in finished form, but instead students must construct the concept(Wandini & Banurea, 2019, p. 8).

Scope of Learning Thinking Subject

Thinking Subject learning in schools focuses on students achieving basic competencies. Thinking Subject learning activities do not focus on mastering Thinking

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Subject material alone, instead they are used as tools and means to help students achieve certain competencies. As a result, the Thinking Subject lessons taught in schools are adjusted to the competencies that students must achieve. Thinking Subject competency standards consist of a set of Thinking Subject abilities needed to achieve certain competencies in Thinking Subject. For each component, this standard is explained in terms of basic competencies, indicators and main material. Organizing and grouping material according to the skills or abilities expected to be achieved.(Wandini & Banurea, 2019, p. 9).

3. METHODS AND PROCEDURES

This study will be structured as research and development (R&D) with a learning application. This indicates that one of the models most frequently applied in the field of instructional design to create a successful product design is the ADDIE model. The idea of creating a learning product design—the foundation of the ADDIE model—is used to enhance fundamental learning performance.

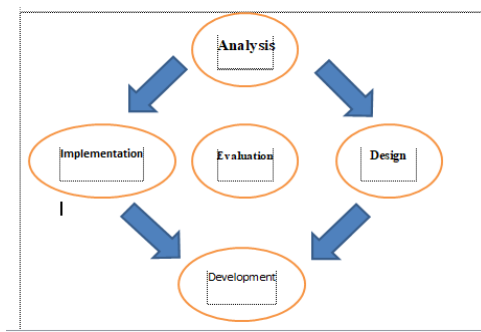


Figure 1. ADDIE model steps

This analysis stage is the initial stage for researchers to develop the Smart Ladder Media learning media by conducting analysis through observing the learning process activities that take place in the classroom. The second stage, namely design. At this stage the product design and preparation of smart ladder learning media is carried out by researchers. This aims to produce prototype 1 learning media in the form of smart ladder learning media. Third, development stage. At this stage, researchers will create a product according to the design. After creating a design, the media is validated by an expert validator. The results of the first development research are called prototype 1, after being developed by researchers, the next step is to validate prototype 1 with experts or experts called validators consisting of media experts, material experts and language experts.

Fourth, namely Implementation After the Smart Ladder learning media is declared "Valid" by media experts, material experts, and language experts, and researchers by students, then the Smart Ladder media can be implemented as a learning medium in student learning activities. Finally, the evaluation at this stage was carried out by researchers starting from the analysis of making smart stairs media using the design stage or designing smart stairs, there were differences seen from previous researchers using styrofoam.(Erviana & Muslimah, 2019)in making smart stair media, while researchers are now using plywood in making smart stair media using plywood, the media is stronger and more durable.

After knowing the steps of the ADDIE model, the data is then analyzed to determine validity. Then the results that will be obtained are interpreted by matching the data results according to the categories.

Intervals	Criteria
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0% - 20%	Invalid
21% - 40%	Less Valid
41% - 60%	Fairly Valid
61% - 80%	Valid
81% - 100%	Very Valid

After knowing whether the data is valid or not, proceed with a practical analysis. Practicality analysis is obtained by administering questionnaire assessment scores from student and teacher responses using interval scale scoring (1-5).

Score Intervals	Criteria
0%-20%	Impractical
21%-40%	Less Practical
41%-60%	Quite Practical
61%-80%	Practical
81%-100%	Very Practical

Next, analyze the potential effects using student learning outcomes with in-depth interpretation product effectiveness categories based on the following table:

No	Score Percentage %	Criteria
1	0% - 20%	Very Ineffective
2	21% - 40%	Ineffective
3	41% - 60%	Less effective
4	61% - 80%	Effective
5	81% - 100%	Very effective

4. RESULTS AND DISCUSSION

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Evaluation of media experts using a questionnaire that the validator filled out. A validity result of 85.77% was obtained by the two validators for the media assessment indicator component. As can be observed, the creation of the smart ladder learning medium is deemed "Very Valid" based on the validity assessment criteria. Evaluation of media experts using a questionnaire that the validator completes. The validity results of the two validators for the media assessment indicator aspect obtained a validity result of 90.36%. Media expert assessment through a questionnaire instrument filled in by the validator. The validity results of the two validators for the media assessment indicator aspect obtained a validity result of 91.67% which can be seen from table 4.4 of the validity assessment criteria. It can be concluded that the development of the smart ladder learning media is "Very Valid".

The results of the student's response obtained a score of 66%. Based on the practicality scoring criteria in table 4.12, it can be concluded that the smart ladder media being developed can be categorized as "Practical".

These results obtained a value of 82%. Based on the potential effect scoring criteria in table 4.13, it can be concluded that the smart ladder media being developed can be categorized as "Very Effective".

5. CONCLUSION

The following conclusion is reached by the researchers based on their study of class II students at SD Negeri 83 Palembang and their use of smart ladder media to enhance their Hots Thinking Subject abilities:

1. The results of developing smart ladder media using validation questionnaires from lecturers and homeroom teachers were declared very valid.
2. The results of the development of smart ladder media in Thinking Subject learning material on addition and subtraction for class II students in elementary schools based on the results of student questionnaires were stated to be very practical and very effective.
3. The results of the development of smart ladder media in Thinking Subject learning on addition and subtraction material for class II students in elementary schools based on the results of test questions were stated to have a very potential effect.

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