



## DEVELOPMENT OF LIGHT TEST BOARD (LTB) MEDIA TO IMPROVE STUDENTS' LEARNING OUTCOMES IN PRIMARY SCHOOL

Rudi Prasetyo<sup>1</sup>, Lilik Handayani<sup>2</sup>, Shirly Rizki Kusumaningrum<sup>3</sup>, Radeni Sukma Indra Dewi<sup>4</sup>

<sup>1</sup>UPT Satuan Pendidikan SDN Karang Sari

<sup>2</sup>UPT Satuan Pendidikan SDN Karangtengah

<sup>3</sup>Pascasarjana, Pendidikan Dasar, Universitas Negeri Malang, Malang, 65145

<sup>4</sup>Pascasarjana, Pendidikan Dasar, Universitas Negeri Malang, Malang, 65145

E-mail: [rudiprasetyo61@guru.sd.belajar.id](mailto:rudiprasetyo61@guru.sd.belajar.id)<sup>1</sup>, [lilikhandayani12@guru.sd.belajar.id](mailto:lilikhandayani12@guru.sd.belajar.id)<sup>2</sup>

### Article History:

Received: 23-09-2022

Revised: 16-10-2022

Accepted: 25-10-2022

### Keywords:

Media, Light Test Board (Ltb), Nature Of Light, Learning Outcomes

**Abstract:** Science learning about the natures of light was an abstract and needed activities skills of science. Science learning needed the learning media that must be researched and developed. This study described the development of the Light Test Board (LTB) learning media, described the application of media in learning, and described the improvement of student learning outcomes. The Light Test Board (LTB) learning media designed with research and development. Development activities used 4D models, that was Define, Design, Development and Dissemination. The expert validated Light Test Board (LTB) learning media. The results of the validation test shows the percentage of 91.5%, it means that the Light Test Board (LTB) learning media is feasible and valid in learning. The author observed the Light Test Board (LTB) learning media in learning. The results of the observation shows a percentage of 93% for the use of learning media by teacher, it means that the Light Test Board (LTB) media can be used properly, and is able to increase students' learning activities in the aspect of process skills and attitudes with a percentage above 82%. Assessment of learning outcomes in the aspect of knowledge after learning using the Light Test Board (LTB) learning media shows an increase in student learning outcomes by 18% based on the percentage of the number of students who completed learning and the average grade of the class increased to 86. So, the Light Test Board (LTB) learning media can improve student learning outcomes.

© 2022 SENTRI: Jurnal Riset Ilmiah

## INTRODUCTION

Learning made consciously and intentionally to get new behavior changes, as a result of experience and interaction with the environment. This behavior changes happen by degrees and permanent. Learning done in a learning activity. Learning processed by interaction between students and teacher and also learning resources in an environment. Teacher made learning and created a good environment that students were easy to learn.

The learning produced interactions achieved learning goals. The interactions happened between students and teacher and between students and learning resources. This interaction showed that learning as a communication process, that means delivered of messages and information (Susilana & Cepi Riyana, 2009). Learning interactions get the goals if learning supported by learning media, that learning media as delivering messages and as learning resources.

The learning process in elementary schools includes learning about the nature of light that studied in the fourth grade of elementary school. Learning the nature of light included in the content of Natural Science that studied on the fifth theme My Heroes. Science in elementary schools as a product and a process. Science studied about the nature of light meant product that contains knowledge, laws, principles, facts, and concepts to explain the nature of light to students. Science learning meant process that science learning included activities to find by the discovery process by practicing scientific skills, so that science knowledge can be obtained.

Learning in elementary schools held by an integrative thematic. All lessons content was integrated. This does not eliminate the nature of science as lesson, so the science learning process still held with existing rules. In elementary schools, the content of science lessons was built on the basis of scientific products, scientific processes and scientific attitudes (Trianto, 2013). Science learning cannot be separated from the nature of science as a process and product. As a process, science developed by scientific activities, namely observation, problem formulation, formulating hypotheses, testing hypotheses through experiments, and drawing conclusions. As a product, science contained facts, concepts, and theories that must be studied. Learning science in elementary schools trained science process skills. Science process skills consisted of observation, classification, communication, measurement, prediction and inference (Trianto, 2013:144).

Science education directed to find out and act, so it helped students to gain understanding deeper understanding of the environment. In addition, students became more aware, understand science concepts (Ari Korata, n.d.).

Science learning about the nature of light as a process used a learning media. The characteristics of science learning included direct evidence and students observation activities. Learning the nature of light must be concrete to make it easier to learn because the students were in the concrete operational stage. Fourth grade elementary school students were in the age range of 10-11 years. Piaget's theory said the students in this age range were at the stage of concrete operational thinking (Trianto, 2013:71). Students understood about somethings easily that were real and can be sensed. Physical experiences and manipulating the environment were very important in the learning process.

The facts knew that the study of the nature of light happened by lecture. Learning don't used learning media. There was not integrated media to learn many natures of light. Some learning media only used for some nature of light, so outcomes learning can't optimal.

The solution of the problems used the Light Test Board (LTB) learning media. LTB media were three-dimensional objects that students manipulated. Learning media were everything can be used to channel messages and can stimulate thoughts, arouse enthusiasm, attention and willingness of students, so they can encourage the learning process in students (Angkowo, 2007:11). Media learning defined as assistive devices in the form of physical and non-physical deliberately used as an intermediary teachers and students in understanding the material learning to be more effective and efficient (Suyanto & Setyo Budi, n.d.). Important element of learning

media was the existence of a container or tool from the message, and the elements of the message that are carried. Learning media was a tool for presenting messages, and the message delivered most important. Students interacted with learning media to get knowledge. Learning media

concreted concepts of matter properties abstract light for easy understanding learners (Dwi Rahma & Susilogati Sumarti, 2016).

Some innovations, research and development, inspired the Light Test Board (LTB) learning media. The Light Test Board (LTB) learning media made because some learning problems, then examines relevant theories and looked another development of learning media. Media Light Test Board (LTB) had some differences with another innovation.

Another similar learning media, the first learning media from Herlina Bolohroy (2017) with a research title " Pengembangan Media Kotak Cahaya pada Materi Pokok Mengenal Sifat-Sifat Cahaya dalam Subtema Perjuangan Para Pahlawan untuk Siswa Kelas IV Sekolah Dasar ". The results of this development that the Kotak Cahaya media made by "Very Good" category and used in learning with a "Very Good" feasibility level (Bolohroy, 2017).

Another similar learning media, the second media from Mariatus Sholiha (2017) with a research title " Pengembangan Media Kotak Cahaya Pelajaran IPA Materi Sifat-Sifat Cahaya ". The results of this development that the Kotak Cahaya media was very suitable in learning, very effective in learning, and very interesting in learning (Sholiha, 2017).

Another similar learning media, the third media from Magyarozza (2022), it showed that the 3-dimensional kosica media (box of light properties) in science learning at the fourth grade elementary school produced was "valid" and "very practical", so it can be used in learning science class IV in elementary (Megyarozza, 2022.). This supported the learning media necessary for learning the nature of light.

The Light Test Board (LTB) learning media compared to another learning media, had differences. This difference was an innovation from the Light Test Board (LTB) learning media. The first difference was another learning media designed from a box, but the Light Test Board (LTB) learning media designed of a board so made it easier to observe. Second, another learning media used color discs to observe the decomposition of light, but the Light Test Board (LTB) learning media used prism glass. Third, another learning media used glass, water and pencil to observe the refraction of light, but the Light Test Board (LTB) learning media used a flashlight and a flat glass (parallel plan).

The Light Test Board (LTB) media sent information and as learning resource. Light Test Board (LTB) media improved student learning outcomes. Learning outcomes was changes in student behavior and it was permanently, because they had learning process. Learning outcomes about knowledge, skills and attitudes (Angkowo, 2007:52). Light Test Board (LTB) media researched and developed. This study described the development of the Light Test Board (LTB) learning media, described the application of media in learning, and described the improvement of learning outcomes for fourth grade students at SDN Karang Sari Blitar City.

## RESEARCH METHODS

This research used research and development method. Research and development are a process or steps to develop a new product or improve an existing product that accountable (Sukmadinata, 2010:164).

### Development Style

The procedure for research and development of learning media was some steps. The steps used the 4D model. The 4D model included Define, Design, Development and Dissemination that developed by Thiagarajan in 1974 (Mulyatiningsih, 2016). The steps described as follows.

#### *Define*

This stage took the definition and determination of development requirements. This activity called needs analysis. This stage analysed the effectiveness of learning, the characteristics of the content of the lesson, the characteristics of the students and the learning objectives before developed this learning media.

#### *Design*

This stage looked initial abilities of students, then selected the appropriate media. This stage author simulated learning media followed to the desired learning steps. Next, made the initial product as a product design.

#### *Develop*

This stage validated initial product by experts. The expert validation results form revised the initial product. After revising product, the next was trial product. The results of the trial used as data for product revision. The last activity of this stage was product implementation.

#### *Disseminate*

The dissemination started using learning media in the class, students used LTB in learning activities. Learning with LTB media had evaluation about learning objectives. If the LTB become a perfect product, then the next product disseminated so that it can be adopted by others. This product disseminated to colleagues, teacher at SDN Karang Sari 1, Blitar City, and teacher working group (KKG) at Cluster 11, Sukorejo District, Blitar City.

### Data Analysis

Development and application of this LTB media collected several data. This development collected qualitative data. The data included media validity test data, learning process data, and students learning outcomes data. Validity test data knew the suitability of the LTB media in learning. Learning process data knew the benefits of LTB media in improving science process skills. Learning outcomes data knew the benefits of media in increasing knowledge.

The data were collected by observation sheets and tests. The observation sheet collected data from the validity test of learning media and data on the learning process. The test collected learning outcomes of increasing knowledge.

The author analyzed data with descriptive qualitative data analysis. The author analyzed, explained and interpreted with descriptive words. The author processed some data by simple qualitative descriptive statistics.

## RESULTS

### Practical Application Results Data for Light Test Board (LTB) Learning Media

The author tested validity of learning media, then trials and revised before LTB media was used in learning. The author tested validity based on the principle of media selection from (Akbar, 2015:117). This activity resulted the good learning media. The

author repaired and re-tested the good learning media. This activity knew the quality of the learning media. Then the author applied the learning media in the class and the results presented below.

Table 1. Learning Media Validity Test Results by Experts

No.	Indicators	Scores (1-5)	
		Expert 1	Expert 2
1	The suitability of the media with the learning objectives.	5	5
2	The suitability of the media with learning materials	5	5
3	The suitability of the media with the characteristics of students	5	5
4	The suitability of the media as a learning resource	5	5
5	Media ability to develop motivation	4	5
6	The ability of the media to attract the attention of students	5	4
7	The ability of the media as a tool to understand and remember information	4	5
8	The ability of the media to repeat the material learned	5	4
9	Ease of use in learning	4	5
10	Efficiency of time, energy, cost	4	4
11	Media safety for students	4	4
12	Media quality (durability, accuracy, etc.)	4	5
<b>Total</b>		<b>54</b>	<b>56</b>
<b>Percentage</b>		<b>90%</b>	<b>93%</b>

The experts tested validity learning media, beside to get a validation, also produced findings for media improvement. These findings are the first, LTB media needed the flash light brightly. Second, the learning media noticed the light of the room that to get maximum results.

Table 2. Results of the Implementation Learning Media

No.	Indicators	Scores (1-5)
1	Time compatibility with media operation	5
2	Media can be used by students	4
3	The steps for using the media are easy to follow/implemented	4
4	Create fun learning	5
5	Improve student learning activities	5
6	Media can be used repeatedly	5
<b>Total</b>		<b>28</b>
<b>Percentage</b>		<b>93%</b>

Table 3. Results of Observation Learning Process

No.	Indicators	Percentage
<b>Science process skills</b>		
1	Observe	94%
2	Try	86%
3	Communication	87%
<b>Attitude/ Affective Domain</b>		
1	Social/cooperation	91%
2	Care	87%
3	Brave	82%
4	Honest	89%

Table 4. Student Learning Outcomes

No.	Descriptions	Pre Test	Post Test
1	The total of students with grades above the minimum mastery learning	23	29
2	Percentage of students with grades above the minimum mastery learning	69%	87%
3	The total of students with grades below the minimum mastery learning	10	4
4	Percentage of students with scores below the minimum mastery learning	31%	13%
5	Average value	74	86

### Data Analysis of Practical Application Results of Light Test Board (LTB) Learning Media

Based on the exposure of data about the results of the validity of the learning media by experts, we know the quality of the learning media. From the explanation, Expert 1 said that the learning media was 90% valid and Expert 2 said that the learning media was 93% valid. The average validity of the learning media was 91.5%. This shows that the learning media was very suitable used in the learning process.

Then the results of observing the implementation of the using of media in the learning process, showed 93%. This percentage showed that many indicators using of learning media that applied by teacher in learning. This means that teacher used the learning media in the learning process very well.

Author observed the impact of using instructional media on the learning process, these observations focused on activities to train science process skills and student attitudes from using of media. Author took data from students that they did actively the observation indicators. The data showed that learning can practice observing activities with a percentage of 94%, trying 86% and communication 87%. This data showed that learning media could training science process skills in learning. The learning student attitudes, the data showed that learning media can develop students' attitudes for cooperation/social with a percentage of 91%, caring 87%, brave 82%, and honest 89%. So, the learning media developed student attitudes.

## DISCUSSION

The results of the validity test showed that the Light Test Board (LTB) learning media was very suitable for use in learning. The validity test is based on the media testing instrument (Akbar, 2015). The Light Test Board (LTB) learning media developed successfully. The development of the Light Test Board (LTB) learning media followed the 4D model, that was Define, Design, Development and Dissemination which was developed by Thiagarajan (Mulyatiningsih, 2016). The steps for developing the Light Test Board (LTB) learning media followed the 4D model, so the learning media is very suitable for learning.

The results of observations of the implementation of the learning media in the learning process showed that the teacher used the learning media very well. The results of good development followed the 4D stages, made the learning media worked easily and useful. Teacher used the learning media with the using learning media indicators that means the learning media was easy to use.

Observations on the impact of using learning media on the learning process showed that the learning media made a good training skills of science process. The learning media developed student attitudes well. This was suitable with the function of the learning media that send messages, stimulated the mind, arouse enthusiasm, attention and willingness of students, so it motivated the learning process by self (Angkowo, 2007:11).

The impact of using learning media on learning outcomes showed that the Light Test Board (LTB) learning media increased students' knowledge. Students got good learning outcomes. The development stages of the Light Test Board (LTB) learning media, media validity test, application of media in learning showed that this media was feasible using and improved the quality of science learning about the properties of light.

## CONSLUSION AND SUGGESTION

The Light Test Board (LTB) learning media developed with Research and Development by 4D model, that was Define, Design, Development and Dissemination. The results of the development showed that the Light Test Board (LTB) learning media was very suitable for learning. The application of the Light Test Board (LTB) learning media improved the quality of science learning about the properties of light.

Every learning media, including the Light Test Board (LTB) learning media, has limitations. The number of learning media adjusted to the large number of students, student organization and class arrangement. So the function of learning media was effectively and efficiently.

## REFERENCES

- [1] Akbar. (2015). *Instrumen Perangkat Pembelajaran*. Remaja Rosdakarya.
- [2] Angkowo. (2007). *Optimalisasi Media Pembelajaran*. Grasindo.
- [3] Ari Korata, R. (n.d.). *PENGGUNAAN MEDIA KIT IPA UNTUK MENINGKATKAN PEMAHAMAN KONSEP SIFAT-SIFAT CAHAYA*.
- [4] Bolohroy. (2017). *Pengembangan Media Kotak Cahaya Pada Materi Pokok Mengenal Sifat-Sifat Cahaya Dalam Subtema Perjuangan Para Pahlawan Untuk Siswa Kelas IV Sekolah Dasar*.
- [5] Dwi Rahma, A., & Susilogati Sumarti, S. (2016). IMPLEMENTASI PEMBELAJARAN SAINS DENGAN MEDIA FOTONOVELA UNTUK MENINGKATKAN MOTIVASI BELAJAR SISWA SD/MI Info Artikel. *JPE*, 5(1). <http://journal.unnes.ac.id/sju/index.php/jpe>

- [6] Mulyatiningsih. (2016). *Pengembangan Model Pembelajaran*.
- [7] *PENGEMBANGAN MEDIA 3D KOSICA ( KOTAK SIFAT CAHAYA ) DALAM PEMBELAJARAN IPA KELAS IVDI SEKOLAH DASAR NEGERI 26 SIGIRANKABUPATEN AGAM*. (n.d.).
- [8] Sholiha. (2017). Pengembangan Media Kotak Cahaya Pelajaran IPA Materi Sifat-Sifat Cahaya. <https://Journal.Trunojoyo.Ac.Id/Rekayasa/Article/Download/3602/2645>.
- [9] Sukmadinata. (2010). *Metode Penelitian Pendidikan*. Remaja Rosdakarya.
- [10] Susilana, R., & Cepi Riyana. (2009). *Media Pembelajaran Hakikat, Pengembangan, Pemanfaatan dan Penilaian*. Wacana Prima.
- [11] Suyanto, I., & Setyo Budi, H. (n.d.). *PENGGUNAAN MEDIA BENDA KONKRET DALAM PENINGKATAN PEMBELAJARAN SIFAT-SIFAT CAHAYA DI SEKOLAH DASAR*.
- [12] Trianto. (2013). *Model Pembelajaran Terpadu*. Bumi Aksara.