THE DEVELOPMENT OF SCIENCE INSTRUCTIONAL MATERIALS BASED ON THE EXPERIENTIAL LEARNING FOR SUBJECT OF THE LIGHT AND ITS UTILIZATION AT 5TH GRADERS IN MI KHADIJAH MALANG

THESIS

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Presented Tarbiyah and Teaching Trainer Faculty of The State Islamic University of Maulana Malik Ibrahim Malang in Partial Fulfillment of The Requirement for The Degree of Sarjana Pendidikan (S.Pd)

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2015

APROVAL SHEET

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THE DEVELOPMENT OF SCIENCE INSTRUCTIONAL MATERIALS BASED ON THE EXPERIENTIAL LEARNING FOR SUBJECT OF THE LIGHT AND ITS UTILIZATION AT 5TH GRADERS IN MI KHADIJAH MALANG

THESIS

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Has been defended in front of the board of examiners on June 25, 2015 and declared PASS
And has been approved by the board of examiners as the requirement for the degree of Sarjana Pendidikan (S.Pd)

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DEDICATE

Thanks to Allah SWT for all the abundance to grace. All praise and gratitude, I present up to the presence only to Rabbul'izzati of worlds. We always give sholawat and greeting to the leader of all people who is Prophet Muhammad, end-time prophet.

Author with all the sweat sincere; dedicate this work for any human being that accompanies writers struggle in resolving scientific papers that may be useful for all.

For my beloved father **Choirul Anam**, and my beloved mother **Nasiroh**.

Acknowledgments of would culminate on their struggle to the author during the study period.

MOTTO

بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

يَا أَيُّهَا الَّذِينَ آمَنُوا اتَّقُوا اللَّهَ وَآمِنُوا بِرَسُولِهِ يُؤْتِكُمْ كِفْلَيْنِ مِنْ رَحْمَتِهِ وَيَجْعَلْ لَكُمْ نُورًا تَمْشُونَ بِهِ وَيَغْفِرْ لَكُمْ وَاللَّهُ غَفُورٌ رَحِيمٌ (٢٨)

"Hai who believe to the prophet, fear to Allah and believe to His Messenger, Allah gives His grace to you on the two parts, and makes to you of the light that with the light you can walk and He forgives you. And Allah is Forgiving and Merciful"

(Q.S Al-Hadiid: 28)

"It is enough if I feel noble because You (Allah) as my Lord and it is enough for me if I'm proud that I'm becoming Your servant. You (Allah) are to me as I love, so give me taufik and knowledge as You love."

(Ali bin Abi Thalib. R.A)

Dr. H. M. Zainuddin, M.A
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ADVISOR OFFICIAL NOTE

Matter : Thesis of Juliana Ulfa
Appendixes : 4 (Four) Exemplar

Malang, June 12, 2015

Dear,
Dean of Tarbiyah and Teaching Sciences Faculty
The State Islamic University of Maulana Malik Ibrahim Malang
At
Malang

Assalamu'alaikum Wr. Wb.

After carrying out several times for guidance, both in terms of content, language and writing techniques, and after reading the following skripsi:

Name : Juliana Ulfa
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Program : Teaching Education of Islamic Elementary School Department (PGMI)
Title of Thesis : The Development of Science Instructional Materials Based on the Experiential Learning for Subject of the Light and Its Utilization at 5th Graders in MI Khadijah Malang

As the advisor, we argue that this skripsi has been proposed and tested decent. So, please tolerate presence.

Wassalamu'alaikum Wr. Wb.

Advisor,

Dr. H. M. Zainuddin, M.A
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CERTIFICATE OF THESIS AUTHORSHIP

I certify that the skripsi I wrote to fulfill the requirement for Sarjana Pendidikan (S.Pd) entitled The Development of Science Instructional Materials Based on The Experiential Learning for Subject of The Light and Its Utilization at 5th Graders in MI Khadijah Malang is truly my original work. It does not incorporate any materials previously written or published by another person, expect those indicated person in quotations and bibliography. Due to fact, I am the only person who responsible for the thesis if there is any objection or claim from others.

Malang, June 05, 2015

Juliana Ulfa
NIM. 11140107

FOREWORD

Alhamdulillah, praise is to Allah Almighty who has bestowed grace, taufiq, and guidance, so thesis entitled "The Development of Science Instructional Material Based on The Experiential Learning for Subject of The Light and Its Utilization at 5th Graders in MI Khadijah Malang" can be resolved well. Sholawat and greetings may remain to the Great Prophet Muhammad that have fought to change the dark ages into the true light that uphold the values of human dignity.

This thesis describes the development science instructional material based on the experiential learning. The writer makes a worksheet of natural science for subject of the light and its utilization at 5th grade in elementary school. The learning material based on the experiential learning meant to help the students more understand about this material.

Happiness and pride for author through the story of the journey did study in S1; the author can resolve this scientific work. Therefore, in this moment, I wish to say a thousand thanks and highest appreciation to the parties that have supported the conclusion of this scientific work. Among them:

1. Prof. Dr. H. Mudjia Rahardjo, M.Si as Rector of Maulana Malik Ibrahim State Islamic University of Malang.
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3. Dr. Muhammad Walid, M.A as Chairman of the Department of Teacher Education of Islamic Elementary School Department.
4. Dr. H. M. Zainuddin, M.A as the advisor who has provided direction and guidance until the research is completed.
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The author only profuse gratitude to say, hopefully help and prayers that have been granted can be a good deeds record to Allah. Finally, I hope this thesis can be a benefit to those who read it and to educational institutions in order to form a generation a better future. May Allah SWT always bestow grace, taufiq, and guidance to us. Amin.

Malang, June 05, 2015

Author,

Juliana Ulfa
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GUIDELINES FOR LATIN ARABIC TRANSLITERATION

Writing Arabic-Latin transliteration in this thesis using transliteration guidelines based on the joint decision of the Minister of Religious Affairs and Ministry of Education and Culture, no.1581987 and no.0543b/U/1987 which can be broadly described as follows:

A. Alfabeth

ا	= a	ز	= z	ق	= q
ب	= b	س	= s	ك	= k
ت	= t	ش	= sy	ل	= l
ث	= ts	ص	= sh	م	= m
ج	= j	ض	= dl	ن	= n
ح	= h	ط	= th	و	= w
خ	= kh	ظ	= zh	ة	= h
د	= d	ع	= ‘	ء	= ‘
ذ	= dz	غ	= gh	ي	= y
ر	= r	ف	= f		

B. Long Vocal

Vocal (a) long	= /a/
Vocal (i) long	= /i/
Vocal (u) long	= /u/

C. Diphthong Vocal

أو	=	au
أي	=	ai
أو	=	/u/
اِي	=	/i/

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ABSTRAK

Ulfa, Juliana. 2015. Pengembangan Bahan Ajar IPA Berbasis Experiential Learning Pokok Bahasan Cahaya dan Pemanfaatannya pada Siswa Kelas V di MI Khadijah Malang. Skripsi. Jurusan Pendidikan Guru Madrasah Ibtidaiyah. Fakultas Ilmu Tarbiyah dan Keguruan. Universitas Islam Negeri Maulana Malik Ibrahim Malang. Pembimbing: Dr. H. M. Zainuddin, M.A.

Pengembangan bahan ajar IPA merupakan salah satu sarana guna membantu memahamkan siswa dalam pembelajaran. Melalui bahan ajar, diharapkan siswa dapat termotivasi dan menumbuhkan kertampilan ilmiah siswa, serta sebagai upaya membiasakan siswa bekerja keras untuk memperoleh pemahaman dan pengetahuan yang lebih mendalam. Bahan ajar yang dapat mendukung proses pembelajaran IPA adalah bahan ajar berbasis Experiential Learning, berupa LKS kelas V SD/MI. Materi pokok yang dibahas adalah cahaya dan pemanfaatannya. Materi ini menjelaskan tentang sifat-sifat cahaya dan pemanfaatannya dalam kehidupan sehari-hari.

Tujuan dari penelitian ini adalah untuk: (1) Mengembangkan sebuah bahan ajar IPA berbasis experiential learning pada pokok bahasan cahaya dan pemanfaatannya dengan objek penelitian siswa kelas V di MI Khadijah Malang, (2) Menghasilkan bahan ajar IPA berbasis experiential learning pada pokok bahasan cahaya dan pemanfaatannya yang valid, efektif dan menarik.

Berdasarkan tujuan penelitian, penelitian ini menggunakan metode penelitian pengembangan model 4-D oleh Thiagarajan dan Sammel. Tahapan dari penelitian pengembangan model 4-D terdiri dari tahap pendefinisian, perancangan, pengembangan dan penyebaran.

Hasil dari penelitian pengembangan bahan ajar IPA berbasis experiential learning memenuhi kriteria valid dengan hasil penelian: (1) validasi ahli materi mencapai tingkat kevalidan 95% (2) validasi ahli media mencapai tingkat kevalidan 90% (3) validasi ahli pembelajaran mencapai tingkat kevalidan 92,5% (4) hasil dari uji coba lapangan mencapai 96,3% (5) hasil dari belajar siswa dengan rata-rata nilai pre-test 72, dan rata-rata nilai post-test 90.9. Sehingga terdapat perbedaan yang signifikan sebesar 18.9 setelah menggunakan bahan ajar. Hal ini menunjukkan bahwa produk yang dikembangkan adalah layak digunakan, efektif dan menarik dalam pembelajaran.

Kata Kunci: *Bahan Ajar IPA, Experiential Learning, Cahaya dan Pemanfaatannya*

ABSTRACT

Ulfa, Juliana. 2015. *The Development of Science Instructional Materials Based on the Experiential Learning for Subject of the Light and Its Utilization at 5th Graders in MI Khadijah Malang.* Thesis. Department of Education Teacher Islamic Elementary School. Faculty of Tarbiyah and Teaching Training. Maulana Malik Ibrahim State Islamic University of Malang. Advisor: Dr. H. M. Zainuddin, M.A.

The development of science instructional material is a medium to assist the students understand better in learning. Through of the instructional material, the students are expected to keep highly motivated and cultivate of scientific skill and effort in self-learning to get knowledge by her self-experience. The instructional material can be support in sciences learning is an instructional materials based on the experiential learning approach, in the form of student worksheet for 5th graders in elementary school. The subject of matter being discussed is *"The Light and Its Utilization"*. This lesson explains about light and its nature, and utilization of light in daily life.

The research objectives are: (1) develop a science instructional material based on experiential learning for subject of the light and its utilization at 5th graders in MI Khadijah Malang, (2) produce the science instructional materials based on the experiential learning are valid, effective and attractive.

Based on the research objectives it, this research use research and development method of 4-D models by Thiagarajan and Sammel. The steps of this model are defined, design, development, and disseminate.

The result of the development of instructional material based on the experiential learning is fulfil the criteria of valid with the result of research are (1) validation by matter expert get 95%, (2) validation by media expert get 90% (3) validation by learning expert get 92,5% (4) the result of field trial get 96,3% (5) the result of student's pre-test mark average 72, and result of student's post-test mark average 90.9. Therefore, there are significant differences is 18, 9 after use of the science instructional material. It's show that the product is valid, effective and attractive in learning process.

Key terms: *Science Instructional Material, Experiential Learning, The light and its utilization.*

الملخص

أولفا، جوليانا.2015. تطوير مواد التعليم للعلوم الطبيعية المأسسة بالخبرة التعليمة في بحث الضوء واستفادته علي تلاميذ الصف الخامس بالمدرسة الابتدائية مالنج. البحث العلمي. قسم تعليم مدرس المدرسة الابتدائية. شعبة التربية. جامعة مالنج مولانا مالك إبرهيم الإسلامية الحكومية. المشرف: الدكتور الحاج محد زين الدين، الماجستير.

تطوير مواد التعليم للعلوم الطبيعية أحد وسيلة لمساعدة فهم التلاميذ في تعلمه. بواسطة المواد، يرجي علي التلاميذ تشجيعا وتنمية علي المهارة العلمية لها، ولكونها محاولة تعويد التلاميذ علي الجهود لتناول المفاهيم و المعارف العميقة. ومواد التعليم التي دعمت علي عملية التعلم للعلوم الطبيعية مواد التعليم المأسسة بالخبرة التعليمة، يعني الكتاب الوظيفي لتلاميذ الصف الخامس بالمدرسة الابتدائية. والمواد الاساسية المبحوثة الضوء واستفادته. وتبين هذه المواد عن أوصاف التصميم واستفاد استخدامه في الحياة اليومية.

والأهدف من هذا البحث: (1) تطوير مواد التعليم للعلوم الطبيعية المأسسة بالخبرة التعليمة في بحث الضوء واستفادته علي تلاميذ الصف الخامس بالمدرسة الابتدائية مالنج (2) تحصيل مواد التعليم للعلوم الطبيعية المأسسة بالخبرة التعليمة في بحث الضوء واستفادته الموثقة، والفعلية، والمجتذبة.

مأسسا علي أهدف البحث، يستخدم هذا البحث طريقة البحث تطوير التصميم –د لتياكاران وسمل، ويتكون تدرج بحث تطوير من تدرج التفسير، و التصميم، والتطوير، والتقريق.

نتيجة البحث لتطوير مواد التعليم للعلوم الطبيعية المأسسة بالخبرة التعليمة الذي يقضي علي المقياس الموثق هو: (1) تصديقات أهل المواد حتى درجة الموثق 95% (2) تصديقات أهل الوسائل حتى درجة الموثق 90% (3) تصديقات أهل التعلم حتى درجة

الموثق 92،5% (4) النتيجة من التجربة الميدانية حتي 96،3% (5) النتيجة من تعلم التلاميذ بمتساوي القيمة لكل الاختبار 72، و متساوي القيمة لكل مركز الاختبار 9،90% حتي يكون الفرق بشكل ملخوظ حوالي 9،18 بعد استخدام مواد التعليم. ويدل هذا الأمر علي النتاج المتطور نتاجا لائقا في استخدامه و فعلية و مجتذبة في التعلم.

الكلمة الاساسية: *مواد التعليم للعلوم الطبيعية، الخبرة التعليمة، الضوء و استفادته.*

CHAPTER I

INTRODUCTION

A. Background

Natural Sciences is a lesson based on the principles, processes that can foster a scientific attitude of students towards science concepts, natural sciences is expected to arouse student's interest in seeking knowledge about the nature and existence of scientific, that's should be able to open up opportunities for students to foster pry naturally.

According to Ahmad Susanto, stated that "the science is a human conscious effort to understand the nature by means of observations are right on target and use procedures, and described with reasoning so that the conclusion". Science is a product and a process that cannot be separated, so that in natural sciences lesson the teacher should presenting the material through the process of research and inquiry, further said that "science as process" then the students learn science through activities related to science such as observing, concluding and performing experiments.

Natural Sciences as a process is a way of thinking and acting to deal with or respond to the problems that exist in the environment, how to think in Natural Sciences, which is associated a work process or manner so as to obtain results (products), this activity is called the scientific process. After seeing the scientific process, then will obtain scientific findings and process in the form of scientific activity.

Scientific activities can be carried out with Experiential Learning. According to the Humanism theory, human potential to seek and find and develop their abilities to be on the problems of how individuals are influenced and guided by their personal purposes that connect to their own experiences. Humanism theory is the theory underlying their experiential learning model where the model is suitable to be applied to the learning materials that are the formation of personality, conscience, change attitudes, and analysis of social phenomena.[1]

Achievement of learning science goals based experiential learning in SD/MI, must refer to one theory of learning that Piaget's theory. Based on this theory concrete operational stage begins at the age of 7-11 years, in which the child begins to think rationally, but have not fully come to terms with the abstract. Competence expected in SD/MI is having the ability of thought, productive action and creative in the realm of the abstract and the concrete.[2] These competencies are designed to be achieved with a learning process based on experiential learning with activities in the form of assignment (project-based learning) which includes the process of observing, ask, try, reason, and communicate.

Experiential learning is the concept of scientific development in the understanding of the material with meaningful experiences learning. The purpose of experiences learning is to develop scientific skills of children, so that the learning process can be performed optimally.

[1] Soemanto Wasti,*Psikologi Pendidikan* (Jakarta: Rineka Cipta,1998), hlm. 135-136.
[2] Yatim Riyato, *Paradigma Baru Pembelajaran*, (Jakarta: Kencana Prenada Media Group,2003), hlm. 12.

Learning can be done optimally not only through experience-based learning approach, but the need for lesson materials that support the learning process, because the lesson materials is one of the means to help the students in learning. Through lesson materials, students are expected to be motivated and working hard to get knowledge, without or accompanied by a teacher

In order to achieve learning process optimally, teachers are required to have a handle lesson materials that can develop learning materials. One is Textbooks are provided by the school. In addition, students are given a handle in the form of Student Worksheet (LKS) by schools, whose purpose is as a resource to develop the ability of students.

However, the facts in the field based on the results of interviews of teachers who teaching science in MI Khadijah Malang, shows that the learning process is not running as desired, still the dominant role of the teacher from students in science learning activities.[3] Long learning paradigm centered on the teacher still thick done by teachers, not many turned to the humanistic and constructivists view that greater involvement of the students. In addition, materials used in the learning process have some lack, which are as follows:

1. Worksheets are used in MI Khadijah Malang, still not optimal, because the contents of the worksheet lot less fit than the Textbook.
2. There was no synchronization between the concepts of the material in the text book and worksheet. In fact, the manufacture of worksheets should be

[3] Interview with Wiwit Sri Widayati, Teacher of Natural Science Lesson in Class V MI Khadijah Malang, dated 9 September 2014.

able to develop at the same time complement the shortcomings of the Textbook.

3. Worksheet circulating in the school as a perceived lack of teaching materials for achievement of student competence. Focusing in particular on the Natural Sciences lessons, the contents of Textbooks and worksheet more likely to theory than practice. Delivery of content should use a lot of experiments, so that students can observe, ask, reasoning, try, create and communicate based on their own experience.
4. Design of layout and design of the language from worksheet that used in the MI Khadijah cannot be an attraction for students. The majority of students will be more motivated to learn when the appearance of books or worksheets that they hold it interesting, like in appearance, in terms of language, as well as images that are used.
5. The use of instructional material have several lack is a problem that causes the learning process becomes not maximized. In order for students to experience the ease of knowing and understanding the concept of the material being taught, then should be formulated and developed an lesson materials that can direct and stimulate the thinking activities of students and teachers in exploring and maximizing the competence of the students, so that the goal of a learning process can be achieved.

Based on the problems that have researchers studied in MI Khadijah Malang, researchers are interested in developing instructional materials which is expected to solve the problem, the instructional materials

that can support the learning process easy to understand. This case of instructional materials in the form of development of student worksheets through experiential learning approach, this will indirectly improve student learning outcomes in achieving the competencies that have been set, can instill character, morals and manners to students. As for moving the learning motivation, best learning occurs when learners have experienced information before obtaining teaching materials that will be studied. In other words, to learners we need to bring the common experience that can be applied in learning. Therefore the title of this research is ***"The Development of Sciences Instructional Materials Based on The Experiential Learning for Subject of The Light and Its Utilization at 5th Graders in MI Khadijah Malang".***

B. The Limitation of Problem

Of the problems that have been identified, the researchers limit the development of instructional materials is to make the student worksheet based on the experiential learning at 5th grade especially in class VB MI Khadijah Malang, for subject of the light and its utilization. Worksheet intended in this study is activities of students that more emphasis on extracting knowledge through experience and practice the application directly.

C. The Problem Formulation

Based on the background, the problem formulation in this study are:

1. How did the process of product development of sciences instructional materials based on the experiential learning at 5th graders in MI Khadijah Malang?

2. How are the validity, effectiveness and attractiveness of the development of science instructional materials in based on the experiential learning at 5th graders in MI Khadijah Malang?

D. The Purpose of Research

Based on the problem formulation, the purposes of research are:

1. Produce the sciences instructional materials based on the experiential learning at 5th graders in MI Khadijah Malang
2. Produce the sciences instructional materials based experiential learning are valid, effective and attractive at 5th graders in MI Khadijah Malang

E. The Benefits of Research

The expected benefits of this research are:

1. For students,
   a. Students can easily understand material of the light and its utilization.
   b. Students got a new experience to use worksheets based on the experiential learning, especially on material of the light and its utilization.
   c. Provide higher satisfaction and curiosity towards learning material after study with use worksheets based experiential learning
2. For teachers,
   a. Provide motivation for teachers to learn with use the worksheets based on experiential learning
   b. Provide knowledge about the use of experiential learning model to be applied in further learning

c. As one alternative instructional material that can be used, so that learning is more efficient, effective, and relevant.

3. For researchers,
   a. As a source of ideas and references in the development of learning resources in the form of other instructional materials.
   b. Increase knowledge about learning models that can be applied to learning in later life.
4. For the reader,
   a. Add insight and science
   b. As a foundation for further research.

F. Product Specifications

Product development that produced is a worksheet with subject of the light and its utilization in science lesson at fifth grade in SD/MI. Product resulting from the development of this resource has the following specifications:

1. Instructional materials is a student worksheet
2. The instructional materials are using experiential learning approach
3. The subject is the light and its utilization in science lesson at fifth grade especially at class VB in MI Khadijah Malang
4. Specifications of Contents

   In it consists of a collection of key word, a simple experiment, observation and discussion, instructions field work independently; self-test at the end of each section and exercises.

5. Specifications of Design

In writing the title of sub-material, using letters Berlin Sans FB Demi Bold with a size 14, while the contents of each sub-material, using letters Franklin Gothic Book with size 12. In each experiment activities, discussions, and exercises using the invitation "Let's try", "Let's the discussion", "Let's Brood", etc.

G. Operational Definitions

To avoid confusion in understanding or interpreting existing terms, therefore given discernment and discussion of terms related to the title of the study that include:

1. Development of Instructional Materials

Development of instructional materials has meaning processing of phrases and motifs with details of the learning tool that contains is learning materials, methods, limitations, and how to evaluate designed systematically and attractive that proposed theme or earlier.[4] This study is focused on the development of instructional materials based experiential learning for science lesson at fifth grade for subject of the light and its utilization.

2. Sciences Based Experiential Learning

Sciences based experiential learning in general is a process of learning activity based experiences are varied, covering the activities of observing, reasoning, formulate relevant questions, evaluating books and other

[4] Komaruddin dan Yooke Tjuparmah S. Komaruddin, *Kamus Istilah Karya Tulis Ilmiah*,(Jakarta: PT. Bumi Aksara, 2000), hlm. 186

information sources critically, carry out experiments using a tool to obtain data, and make predictions and communicating results.[5]

[5] Ahmad Susanto, *Teori Belajar Pembelajaran di Sekolah Dasar*, (Jakarta: Kencana Prenada Media Group, 2013), hlm. 167

CHAPTER II

REVIEW OF LITERATURE

A. Previous of The Study

As far as searches conducted by researchers, there are some reviews of this literature with research, including "Development of student worksheet based aptitude treatment interaction (ATI) learning on the subject of vibrations and waves in class VII SMP Muhammadiyah 1 Berbah" by Riefki Handayani in research journals in 2013. The aim of this research resulted in the development of students worksheets based ATI with using 4-D models. Results of this study meet the criteria very well and including category fit for use. Shortcomings in this LKS, there are some foreign terms for students so need to be equipped with a gloss.[6]

"Development of student worksheet based experimental method to optimize the understanding of scientific concepts in class V SDN Trowono II" by Hanafita Hajar Utami. In this study, researchers developed teaching materials through the utilization of research results of learning science in the form of worksheets based experiments with development product in category good and fit for use. The effectiveness of worksheet can through from student learning outcomes. Deficiencies contained in this research include the

[6] Riefki Handayani, "Pengembangan lembar kerja siswa (LKS) berbasis pembelajaran aptitude treatment interaction (ATI) pada pokok bahasan getaran dan gelombang kelas VII SMP Muhammadiyah 1 Berbah, *Jurnal*, Universitas Negeri Yogyakarta, 2013.

development of worksheet still are global objects that need to be focusing research.[7]

"Development science worksheet integrated by webbed models based on experience with environmental beach themes for students of SMP/MTs class VII" by Arum Widyarini, and Ika Kartika students of the state university of Semarang in educational journals in 2012. The procedure of development is Borg and Gall. This study aims to generate science integrated worksheet based experience with themes of environmental coast to class VII SMP / MTs oriented through webbed models are valid, effective and can motivate students. Results of an integrated science worksheets developed meet the quality is very good with percentages of 92.46% (material expert), 86.46% (media expert), and 87.76% (teachers SMP/MTs). The downside of this textbook is only limited materials developed on the theme of coastal environments.

"Development of science worksheet based experience on the theme of fun exercising and sweating to develop process of science skills of students SMPN 1 Klaten" by Rulita Purnaningtyas. Development of research conducted with ADDIE. Research carried out until the test phase is limited. The results showed that the category of worksheets is 'very good'. Application worksheet on learning science shows that the process science skills of students

[7] Hanafita Hajar, "Pengembangan LKS berbasis metode percobaan untuk mengoptimalkan pemahaman konsep sains kelas V SDN Trowono II", *Jurnal*, Universitas Negeri Semarang, 2012

have increased. The downside of this LKS only covers six observation activities. [8]

Based on some previous studies that have been described above, it can be concluded that the research conducted by several researchers have differences and similarities with this study. Therefore, referring to the characteristics of the subjects who became a theme in this research is a science, this study wanted to try to develop the science worksheets on subject of the light and its utilization at class VB in MI Khadijah Malang by using the experiential learning approach.

So it is easier to compare the differences between previous studies with this research, it will be described by using the following table:

Table 2. 1 Originality Research

TITLE	SIMILARITY	DIFFERENCE	ORIGINALITY
Development of student worksheet based aptitude treatment interaction (ATI) learning on the subject of vibrations and waves in class VII SMP Muhammadiyah 1 Berbah	• Development of student worksheet • Model development using 4-DModels	• Using the base of ATI • Material of vibrations and waves • The subjects in class VII SMP Muhammadiyah 1 Berbah	Based on the characteristics of the subjects to be a theme in this research is science, these studies want to try to develop instructional materials in the form of student worksheet in class VB for subject of the light and its utilization, which became the object of study in MI Khadijah Malang
Development of student worksheet based experimental method to optimize the understanding of scientific concepts in class V SDN Trowono II by Hanafita Hajar Utami	• Development of student worksheet • The subject of research at the primary school level	• Using the base experimental methods • Model development is Borg and Gall • Materials is science concepts	

[8] Rulita Purnaningtyas, "Pengembangan lembar kerja siswa (LKS) IPA terpadu berbasis experience dengan tema asyiknya berolahraga dan berkeringat guna mengembangkan ketrampilan proses sains siswa SMPN 1 Klaten", *Jurnal*, UNY, 2012

		• Location in SDN Trowono II, class V	using Experiential Learning approach.
Development science worksheet integrated by webbed models based on experience with environmental beach themes for students of SMP / MTs class VII" by Arum Widyarini, and Ika Kartika	• Development of student worksheet • Based on experience	• Model of development is Borg and Gall • In the themes of coastal environment • The subject is student of SMP/Mts in class VII	
Development of science worksheet based experience on the theme of fun exercising and sweating to develop process of science skills of students SMPN 1 Klaten" by Rulita Purnaningtyas	• Development of student worksheet • Based on *Experience.*	• Model of development is ADDIE • On the theme of fun exercising and sweating • The subjects is students of SMPN 1 Klaten	

B. Study of Literatures

1. Learning Theory

Learning theory that became the basis of this research are follows; (a) Theory of humanism and, (b) Experiential learning approaches.

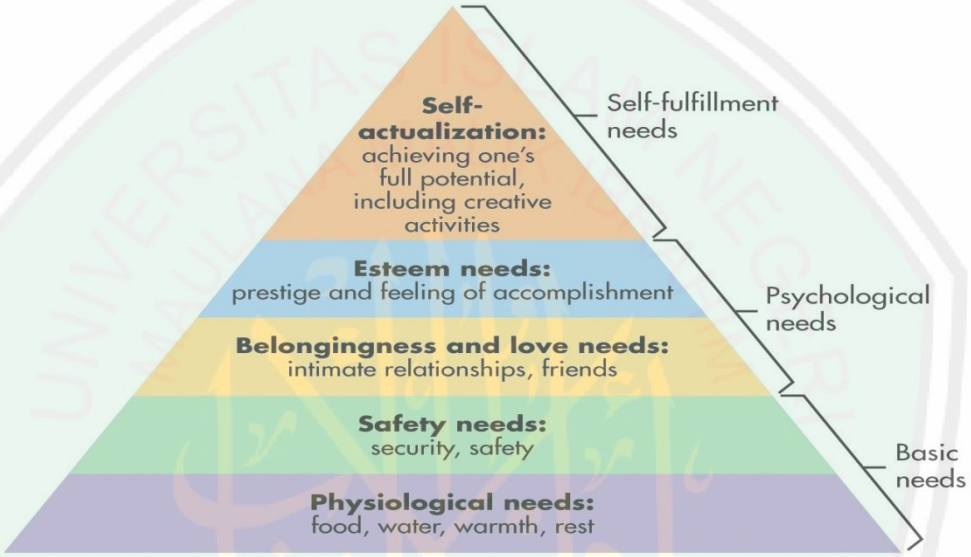
a. Humanism Theory

Theory of humanism is explanation include a definition of the theory, the advantages and disadvantages of the theory and application of the theory of humanism in learning.

1) Definition of Humanism

Humanism education is very concerned with the sense of freedom and responsibility. This theory has the goal of education is

humanizing in order to have a goal to achieve self-actualization, self-understanding and self-realization that the optimal learning which topped the achievement according to Abraham Maslow's hierarchy of needs.[9] Here's pyramid according to Abraham Maslow's hierarchy of needs:



Picture 2. 1. Hierarchy of Needs by Maslow

Abraham Maslow said that in the individual there are two things:

a) A positive business to thrive

b) The power to resist or reject the these development

Maslow argued that individuals behave in an effort to meet the needs of the hierarchical. When someone has been able to meet the first requirement, such as psychological needs, then he may want a requirement that lie on it, namely the need to get a sense of security and so on.[10]

Humanistic flow does not have specific learning theory, but merely eclectic, which intends to use the appropriate theory (cognitive) as

[9] Mahmud, Dimyati, *Psikologi Pendidikan* (Yogyakarta:BPFE,1990), hlm. 168.
[10] Ibid,.

long as the learning objectives achieved. The principles of humanistic study, among these:

a) Human has the ability to learn naturally.
b) Significant learning occurs when students felt the subject matter was relevant to their own purposes.
c) Learning that involves a change in the perception of itself considered threatening and tend to reject.
d) Tasks that threaten self-learning is more easily perceived and assimilated when external threats it gets smaller.
e) If the threat to self-student is low, the experience can be obtained by a variety of different ways and there was a learning process.
f) Meaningful learning obtained student by doing.
g) Learning easily when students are involved in the learning process and take responsibility for the learning process.
h) Learning owns initiative involving the whole student personally, feeling and intellect, a way that can provide deep and lasting results.
i) Trust in self, independence, creativity, more easily accessible, especially if students are accustomed to introspection and criticize him and judgment of others is a second important way.
j) Study of the most socially useful in the modern world are learning about the learning process, a continuous openness to experience and integration into the self-regarding the change process.[11]

[11] Ibid, hlm. 169

2) The Strengths and Weaknesses of Humanism Theory

The strengths of humanism learning theory are as follows:

a) As the formation of personality, conscience, change attitudes of social phenomenon analysis.
b) Students are happy, and take the initiative in learning.
c) The teacher accepts students for what it is, and be able to understand the minds of students.
d) In a study on this theory, students are required to strive in order to gradually able to achieve self-actualization as well as possible.
e) Always prioritize the things that nuanced democratic, participatory-dialogical and humanist.
f) Learning atmosphere of mutual respect, the freedom of speech, and freedom of expressing ideas.
g) The involvement of students in a variety of activities in schools, and the more is the ability to live together (communal-social) among students who certainly have a different view.
h) Humanistic theory has a significant influence on psychology and popular culture. Today many psychologists who accept this idea when discussing theories about personality, human subjective experience has a higher weight than the reality.[12]

The weakness of humanism learning theory is:

[12] Ibid,.

a) This theory ignores the conscious aspects of human behavior as it looks at the experience of the present and the future, rather than in the past is usually filled with traumatic experiences that cause a person to experience a psychological disease.

b) The idea that a person must be able to react realistically to the surrounding world is still very difficult to accept. Everyone could not let go of subjectivity in looking at the world because we do not know the world objectively.

c) Many concepts in humanistic psychology, such as people who have managed to actualize himself, is still dark and subjectively.

d) Student difficulty in recognizing themselves and the potentials that exist in themselves.

e) The learning process will not be successful if there is no motivation and supportive environment.

f) It is difficult applied in a practical context.[13]

3) Application of Humanism Theory in Learning Process

Applications of humanism theory to further highlight the freedom of the individual or the student in understanding the learning materials to obtain information or new knowledge in its own way during the learning process. In this theory the students act as subjects students, the teacher's role in humanism is a facilitator of learning.[14]

[13] Ibid, hlm. 170.
[14] Soemanto, Wasty.*Psikologi Pendidikan (Landasan Kerja Pemimpin Pendidikan*) (Jakarta: Rineka Cipta,1998), hlm. 114.

Students In humanist learning is placed at the center in learning activities. Students become actors in defining their own learning experience. Thus, students are expected to find their potential and develop this potential is maximization. Students are free to express their own ways of learning. Students can be active and not just accept the information from the teacher.

The role of the teacher in the learning humanism is to be a facilitator for the learners by providing motivation and facilitate learning experiences, by implementing strategies that create active learners, and to submit systematic learning materials. The role of the teacher as facilitator is:[15]

a) Paying attention to the creation of the atmosphere of early learning
b) Creating a fun classroom atmosphere there by increasing the learners to follow learning by applying the learning method of varying
c) Set the learners to be able to directly communicate actively with the peer during the learning process
d) Trying to organize and provide resources for learning that Palin widely and easily used to help learners achieve their goals
e) Placing him as a flexible resource to be utilized students either individually or in groups (teachers to be a place to ask learners without fear)

[15] Sadulloh, Uyoh, *Pengantar Filsafat Pendidikan* (Bandung: Alfabeta, 2008), hlm. 18.

f) In response to both expressions in a class and receive good content is the intellectual (not filled with criticism that motivate learners to express themselves)

g) Be warm and try to understand the feelings of learners (empathy) and straighten considered less relevant in a way that is polite

h) In the learning group, he took the initiative to participate in the group and try to express feelings and thoughts by not demanding and not force, but as a personal contribution which may be used or rejected by learners

i) As a human who is not always perfect, the teacher would recognize, acknowledge and accept the limitations themselves by willing and happy to receive a better view of the learner.

Humanism in the application form contains learning how to seek to combine the skills and cognitive information, the effective aspects, values and interpersonal behavior. In connection with this it will be explained below some application programs in humanism in learning.[16]

a) Confluent Education Cooperative Learning

Confluent Education Cooperative learning is to combine or unite educational experiences with the affective cognitive learning in the classroom. This is an excellent way to engage students personally in the material of lesson. For instance, Indonesian teachers assign tasks to the students to read a novel, say for example, about "courage", a war

[16] Karwono & Mularsih Heni, *Belajar dan Pembelajaran Serta Pemanfaatan Garis Belajar* (Jakarta: Cerdas Jaya, 2010), hlm. 74.

novel. Through the assignment, students are not only expected to understand the contents of the reading well but also gain awareness of interpersonal better with street addresses of their own notions of courage and fear.

b) Open Education

Open Education or open educational process is a process of education that provides the opportunity for students to move freely around the class and choose their own learning activities. Although open education provides opportunities for students to move freely around the room and choose their own learning activities, but the guidance of teachers still needed.

c) Cooperative Learning

Cooperative learning is a good foundation for improving student achievement encouragement. Cooperative Learning has three characteristics:

(1) Students work in teams to learn that small (4-6 members), this composition remained for weeks.

(2) Students are encouraged to help each other in the nature of academic study materials or in performing the task group.

(3) Students are given a reward or prize on the basis of group achievement.

d) Independent Learning

Independent Learning or self-learning is a learning process that requires students to be subject to design, organize, and control their own activities in a responsible manner. This process does not depend on the subject matter and instructional methods, but the one who has learned that students, includes anyone who decides what will be learned who to learn something.

In essence, the approach focuses on the potential human humanism to seek and find the skills they have and develop such capabilities. This includes social and interpersonal skills for self-development methods aimed to enrich themselves, enjoying the presence of life and society. Skills or the ability to build positive self has become very important in education. Therefore, the flow of humanism introduces an adaptive learning model, known as Experiential Learning.[17]

b. Experiential Learning Model

Experiential learning is a holistic models of the learning process in which people learn, grow and thrive. The mention of the term experiential learning was done to emphasize that experience plays an important role in the learning process and distinguish it from other learning theories such as cognitive learning theory or behaviorism.

[17]Trianto, *Model Pembelajaran Terpadu Dalam Teori Dan Praktek* (Jakarta: Prestasi Pustaka, 2007), hlm. 68.

In this case, experiential learning uses the experience as a catalyst to help learners develop the capacity and capability in the learning process so that learners are accustomed to think creatively.

The results of the learning process not only advertise experiential learning in the cognitive aspects, also unlike the theory of behavior that eliminates the role of subjective experience in the learning process. Knowledge that is created from this model is a combination of understanding and transforming experience.[18]

Experience as a source of knowledge and strength in human development has been visible since the beginning of the fourth century BC. The idea of education-based experience or called "learning by doing" has a long history. Initially, the teacher calls experiential education as learning styles in outdoor. Similarly, the adventure of education program, which takes place in outdoors, utilizing real-world experience to achieve learning goals.[19]

Thinking about the education based experience is growing with the advent of the work of John Dewey, which reveals the importance of learning through experience as a cornerstone in establishing a formal education. This educational model continues to grow, until in 1977 established the Association for Experiential Education (AEE).

Proverb says that "experience is the best teacher". Then the same thing has been put forward by Confucius several centuries ago "*what*

[18]Rusman, *Model- Model Pembelajaran: Mengembangkan Profesionalisme Guru* (Jakarta: Rajawali Pers, 2011), hlm. 34
[19] Soemanto,Wasti,*Psikologi Pendidikan* (Jakarta: Rineka Cipta,1998), hlm. 136.

i hear, I forget, what I hear and see, I remember a little, what I hear, see and ask questions about or disc with someone else, I begin to understand, what I hear, see, discus, and I do, I acquire knowledge and skills, what I teach to another, I master". If the statement that Confucius developed a simple, it will get some form of learning how to learn by listening to forget, by listening and seeing will remember a little, the way to hear, see and discuss with other students will understand, in a way to hear, see, discussion and will acquire knowledge and skills, and how to master the best lesson is to do. With direct experience of learning materials, students are expected to further establish the meaning and impression in memory or memory.[20]

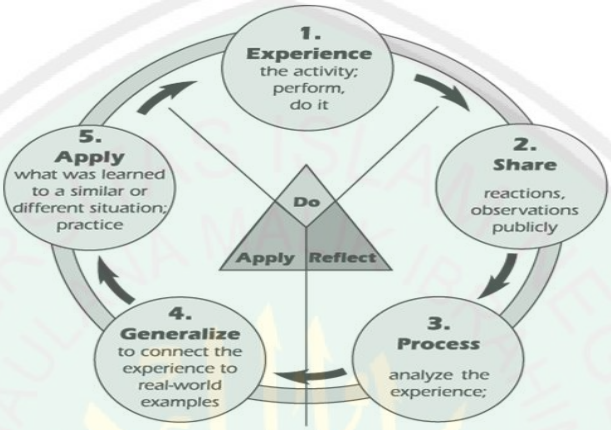
Learning with experiential learning models were introduced in 1984 by David Kolb in his book entitled "Experiential Learning, experience as the source of learning and development". Experiential learning defines learning as "the process by which knowledge is created through changes in the form of experience. Knowledge caused by a combination of understanding and transforming experience".

David Kolb develops a learning model called "experiential learning" which basically is a simple experiential learning begins with doing, reflection and then apply. If elaborated again it will be comprised of five steps, starting from the experience, share, "felt-sense" or the analysis of the experience (process), take lessons or conclude (generalize), and

[20] Ibid., hlm, 39

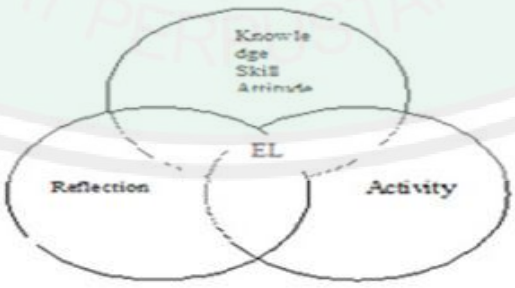
apply. So it goes back to the first phase, naturally. This is actually a never ending cycle.[21]

Here is the concept of experiential learning models:



Picture 2. 2. Experiential Learning Model

Experiential learning contains three aspects: knowledge (concepts, facts, information), Activity (application in activity) and Reflection (analysis of the impact of activities on the development of the individual). All three are important contribution to the achievement of learning objectives. The relation of the three can be described as follows:[22]



Bagan relasi antara EL dengan aspek pembelajaran

Picture 2. 3. Relation of Knowledge Aspects

[21] Ibid.
[22]Rusman,*Model- Model Pembelajaran: Mengembangkan Profesionalisme Guru.* (Jakarta: Rajawali Pers,2011), hlm. 39.

Such learning model provides the opportunity for students to engage in active learning activities. Furthermore, Hamalik stated that learning by experience to give a set or series of learning situations in the form of involvement of actual experience designed by the teacher.[23]

According to the theory of experiential learning, so that effective teaching and learning process, a student must have 4 abilities as in the table below:

Table 2. 2. Students Ability in Experiential Learning

Ability	Prioritization
Concrete Experience (CE)	*Feeling*
Reflection Observation (RO)	*Watcing*
Abstract Conceptualization (AC)	*Thinking*
Active Experimentation (AE)	*Doing*

c. Theory of Imam Al-Ghazali

Al-Ghazali's view on education will include views of the primacy of science and the primacy of the person who has it, the ethics of learning and teaching. Al-Ghazali expressed his views about the virtue of provocation have the knowledge. As word of God in surah Al-Mujadalah : 11:

وَإِذَا قِيلَ انْشُزُوا فَانْشُزُوا يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ ۚ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ

"*Allah will exalt those who believe among you and those who were given science some degree* ".

[23] Oemar Hamalik,*Proses Belajar Mengajar* (Jakarta: Bumi Aksara,2008), hlm. 104.

The virtue of science is clearly illustrated in the Ihya Ulumuddin where the first chapters there are 14 verses which reference will be made in the primacy of science and the people who have the knowledge and supported by 27 hadith. In addition to its opinion rested on two main principles namely the Quran and Hadith. Al-Ghazali also relied to postulate naqli and aqli.[24]

Al-Ghazali also emphasized the role of teachers and treatment of students in the teaching process. He stressed the principle of teaching through observation and cognitive. In addition, than that he also uses humanist approach stating that educators should view students as human beings are holistic and respect them as human beings. In this case, Al-Ghazali strongly emphasizes how the characters wake educators.[25]

In the view of Al-Ghazali, basically sense the value of a human being who has two meanings that is physical, commonly referred to as brain uncover all kinds of knowledge and the second is the spiritual sense is the same as qalb in terms metaphysic.[26] Mental discipline is a change in behavior based on experience. This learning theory is based on experiments and developed without relying only to the philosophical or speculative. Learning is described as the development of the mind which is hereditary.[27]

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[24] Imam al-Ghazali, *Ringkasan Ihya' Ulumuddin* (Jakarta: Mutiara Faza, 2008), hlm.84.
[25] Ibid..
[26] Khafidi, *Peranan Akal dan Qalb Dalam Pendidikan Akhlak (Studi Pemikiran Al-Ghazali)* (Semarang: Institut Agama Islam, 2013), hlm.73
[27] Suhid dan Fathiyah Fakhruddin, *Gagasan Pemikiran Falsafah Dalam Pendidikan Islam*. Jurnal, Universitas Putra Malaysia, 2012.

According to Maslow, there are five levels of human needs of purposes that are lower to the higher purposes. The purpose is perfection level physiology, perfection of safety, social perfection, perfection of the highest self-esteem and self-perfection is. The concepts of human welfare and the good life give values that are very important in social justice and demands satisfaction balance between material and spiritual purposes. According to al-Ghazali, in meeting the welfare lies to the protection of religion (al-deen), soul (nafs), reason (aql), descendant (Nasb) and property (maal). All efforts to meet the needs of life it is necessary to be based to the five principles. In the view of al-Ghazali, religion laid man's relationship with God and fellow human beings.[28] Religion puts human relationships is balanced in manner each other to achieve the welfare of all human beings. Religion becomes a moral filter in human action to meet the necessities of life. While the property is placed in the last position, because according to al-Ghazali treasure is not the goal of life is just the opposite property as a tool for achieving the purpose of life itself.

2. Instructional Materials

Instructional materials explain about understanding the development of instructional materials and several of instructional materials especially a student worksheet. There are follows:

a. The Development of Instructional Material

[28] Deden Himawan, *Tips-Tips Efektif Pimpinan Rohani Al-Ghazali Buat Remaja* (Selangor: PTS Publications & Distributors, 2007), hlm. 42.

Development of instructional materials for granted is the ability to be continuously improved by each teacher. If a teacher does not have the ability to develop lesson materials that vary the teacher will be stuck in a monotonous learning situations and tend to be boring for students.

Lesson materials are an important part of learning, because it can be used as a learning resource, both teachers and students. According Suprawoto, there is some understanding of teaching materials:

1) Instructional materials are all forms of materials used by teachers in implementing the teaching and learning activities in the classroom. The material is in the form of written materials or materials not written
2) Instructional materials are the information, tools and or text that is needed by teachers for planning and review of implementation of learning
3) Instructional materials arranged in a systematic matter whether written or not so as to create the environment/atmosphere that allows students to learn.[29]

Form of instructional materials can be printed materials such as handouts, books, modules, student worksheets, brochures, leaflets, wall chart. Audio Visual such as: video/movie, VCD. Audio such as: radio, cassette, CD audio, PH. Visual: photos, drawings, models/mockups. Multi Media: CD interactive, computer-based Internet.

According to the National Education Ministry, good instructional materials include certain characteristics, namely:[30]

[29] Ibid..

1) Generate interest in reading
2) Written and designed for students
3) Describe the instructional objectives
4) Prepared by flexible learning patterns
5) The structure is based on the needs of students and the final competition will be achieved
6) Provide opportunities for students to practice
7) Accommodate difficulties students
8) Provide a summary
9) The writing style communicative and semi-formal
10) The density based on the needs of students
11) Packed to the instructional process
12) Having a mechanism to gather feedback from students
13) Explain how to study teaching materials

Components of teaching materials according Pannen, consists of three core components, the main component, complement components, and component evaluation of learning outcomes. The main component contains information or who want delivered main topic.[31]

It can be concluded that the teaching materials is one of the media to explore the work of someone who documented through print media that can be consumed by the general public. Instructional materials used to

[30] Depdiknas,2006, *Pengembangan Bahan Ajar* (Www.Jardiknas.Org, diakses 9 Mei 2014)
[31] Fitratul Uyun. *Pengembangan Bahan Ajar Pembelajaran Al-Qur'an Hadis dengan Pendekatan Hermeneutik Bagi Kelas 5 MIN 1 Malang*.*Thesis*. Malang: program Pascasarjana UIN Maliki Malang. 2010.

make the learning process where learning is done, teaching materials is a symbol that we are the teachers to equip the students in the form of true science, and has directed the rationale.

b. Student Worksheet (LKS)

Student worksheet (LKS) is a sheet that contains the tasks that must be done by learners. LKS is usually in the form of instructions, steps to complete a task, a task which was ordered in sheet activities should clearly be achieved basic competencies. In terms of usability, Trianto defines that the student worksheet is guide student that use to conduct investigation and problem solving. This worksheet can be a guide for the development of cognitive exercises, as well as guidelines for the development of all aspects of learning in the form of guide experiments or demonstrations.[32]

Student worksheet contains instructional materials packaged integration that allows students to learn the material independently. Based on definition above, LKS in different subjects will be different forms. LKS in science subjects generally contain activities guide investigations or experiments, data tables, and issues that need to be discussed students from experimental data.

Worksheets for elementary school are simple and pictorial. It was adapted to the level of mental development of children who are still operational concrete. For level of middle school students, the worksheet is

[32]Trianto,*Model Pembelajaran Terpadu Dalam Teori Dan Praktek* (Jakarta: Prestasi Pustaka,2007), hlm. 148.

more abstract in accordance with the level of their mental development according to Piaget already capable of formal thinking.

Student worksheet is prepared by teachers to help students in the learning process. LKS is designed to guide students to solve problems that are provided by the teacher. LKS can also be used as a guide conducting experiments.

According Dhari and Haryono, the benefits of using worksheets for students is to:

1) Improve student activity in following the learning process.
2) Train and develop process skills in students as the basis for the application of science.
3) Helping to obtain a record of the material learned through these activities.
4) Helping to add information about the concepts learned through learning activities of students

Student Worksheet will be developed are worksheets that focus on learning through experience (experiential learning). Worksheet-based experiential learning can include various forms of worksheet. The existence of forms of worksheets as expressed by Trisnawati:

1) LKS expository:

Owned by LKS expository character is:

a) The observation has been set in advance so that students and teachers know the eventual outcome,

b) Deductive approach, namely student apply general principles to understand the specific phenomenon,

c) The procedure has been designed by teachers, students stay perform experiments by following the procedure

2) LKS inquiry

The characters are owned LKS inquiry is:

a) The observation has not been previously established that the observations by students can be varied,

b) The approach is inductive, that are by observing specific examples of complex student receives a general principle,

c) The procedure of LKS is designed and developed by students.

3) LKS discovery

The characters are owned by LKS discovery:

a) The results obtained have been defined previously, but the only teacher who knows,

b) The approach is inductive, that are by observing the special complex example, students receive a general principle,

c) The procedure has been designed by teachers, students stay conducting experiments.

4) LKS-based problems

The characters are owned by LKS-based problems are:

a) The observation is predetermined, but the only teacher who knows and students do not already know,

b) Deductive approach, which is to apply general principles to understand the specific phenomenon,

c) Procedures designed by the students.

Today, worksheet still contains only material and exercises. Necessarily the worksheets can be packaged in accordance with the needs of teachers and students. This is supported by a Sutedjo statement. According Sutedjo, here is the packaging material in the form of worksheets that can be done by the teacher:

1) Worksheets that help students to discover concepts
2) Worksheets that help students apply and integrate the various concepts that have been found
3) Worksheets that serves as a study guide
4) Worksheets that serves as reinforcement
5) Worksheets that serves as a cue trial[33]

This is confirmed also by Arsyad that LKS as a source of learning has many benefits. Arsyad suggest several advantages, among others:

1) Students can learn and advance in accordance with the respective speeds So that students are expected to master the subject matter.
2) In addition to be able to repeat the material in printed media, students will follow a logical sequence of thought.
3) Allows any combination of text and images which can add to the appeal, and can facilitate the understanding of the information presented.

[33] Sutejo, *Lembar Kerja Siswa* (http:www.google.com, diakses 7 April 2014)

4) Special on programmed text, students will participate actively because they have to respond to the questions and exercises.

5) The material can be reproduced with the economical and distributed easily.

Therefore, Darmodjo and Kaligis, describes the preparation of worksheets must meet various requirements, namely the didactic requirements, construction requirements and technical requirements.[34]

1) Terms of didactic

Terms didactic means LKS must follow the principles of effective learning, namely:

a) Taking into account the existence of individual differences that can be used by all students who have different capabilities. Worksheets can be used by students slow, medium and clever. Common error is considered homogeneous class.

b) Emphasis on the process to find concepts that serve as a guide for students to search for information not notify information tool.

c) Has a variation of the stimulus through various media and activities so that students can provide the opportunity for students to write, experiment, lab work, and so forth.

d) Develop communication skills social, emotional, moral, and aesthetic in children, so it is not only indicated to know the facts and concepts of academic and social skills and psychological well.

[34] Darmodjo, H Dan Kaligis, J,*Pendidikan Ipa II*,(Jakarta: Dirjen Dikti,1993), hlm. 41-46.

e) Determine the learning experience to students' personal development goals instead of the subject matter.

2) Terms of construction

Terms of construction are the requirements that are pleasing to the use of language, sentence structure, vocabulary, level of difficulty, and clarity in LKS. The terms of the construction, namely:

a) LKS using language appropriate maturity level of the child.

b) LKS using clear sentence structure.

c) LKS has sort order lessons according to the student's ability level, meaning that the simple things towards things more complex.

d) LKS avoid the question is too open.

e) LKS refers to the standard books in the limited ability of students.

f) LKS provides enough room to give breadth to the students to write and illustrate the things that students want to convey.

g) LKS using simple sentences and short.

h) LKS can be used for children either slow or fast.

i) LKS has identity to facilitate administration.

3) Requirements engineering

a) Posts

Posts in LKS expected to consider the following things:

(1) LKS using block letters and not using Latin letters / roman.

(2) LKS uses a rather big bold letters to the topic.

(3) LKS use at least 10 words in 10 lines.

(4) LKS use frames to distinguish the command line with the students' answers

(5) LKS used to compare between letters and amber with mismatched.

b) Image

Good image is the message effectively to the user LKS. Images and illustrations should be able to:

(1) To help students understand the material.

(2) Demonstrates how to develop a sense.

(3) To help students think critically.

(4) Determining the variables to be solved in the learning activities.

c) The appearance and layout

Should be able to:

(1) To help students understand the material to show the sequence of events in a logical and systematic.

(2) Indicates the parts that have been followed from beginning to end.

(3) The design should be attractive.

In the preparation of worksheets required to follow the procedures formulation as follows:

1) Determine the basic competencies, indicators and learning objectives to be modified to a form of learning with LKS.

2) Determine the basic process skills against competencies and learning objectives.

3) Determine the activities that must be carried out in accordance with the students' basic competencies and indicators of learning objectives.

4) Determine the tools, materials and learning resources.

5) Finding the proceeds appropriate learning objectives.[35]

3. Natural Sciences

a. The Context of Natural Sciences

Mulyasa said that, the Natural Sciences related to the natural way of finding out about systematically, so that science is not just mastery of a collection in the form of facts, concepts or principles but also a process of discovery. Science education is expected to be a discovery[36]

b. The Characteristics of Natural Sciences

Natural Science Learning is a process learning students related to the natural way of finding out about systematically, so that science is not just mastery of a collection of knowledge but also as a process. Characteristics that exist in science lessons are emphasis on process rather than outcomes. Learning science emphasis on direct experience to develop the competence of learners to be able to understand better learning through the process of figuring out and do, it is intended to gain a deep understanding of the learners. Science learning characteristics including the following:

1) Implanting to students the importance of empirical observations or real.

[35] Depdikbud,1996/1997, hlm. 25-26,(http:www.google.com, diakses tanggal 9 Mei 2014
[36] *Ibid*, hlm. 9

2) Provide a learner through a variety of practices or other activities that support the activity of the students that are competent in science lessons.
3) Introducing the world of technology through creative activities in the activities of designing and manufacturing simple tools and description of any symptoms and the efficacy of science in addressing various issues.[37]

c. The Essence of Sciences

Science is one of the basic subjects in the curriculum in Indonesia, including the primary school level.[38] One of the problems facing education today is the lack of implementation of the learning process that is applied to the teachers at school. Implementation of the learning process that takes place in the classroom is only directed at the student's ability to memorize information, the students brain is forced only to remember and hoard a variety of information without being required to understand the information.[39]

Attitudes in science learning that mean that the scientific attitude. So, with science learning in primary schools is expected to foster a scientific attitude as a scientist. The types of attitudes in question, is: scientific attitude, confident, honest, unhurried, and the objective of the facts.[40]

Studying science is basically as complement other scientific. Without science a scientist will never find Newton's laws, without science

[37] Trianto, *op.cit.*, hlm.103-104.
[38] Ahmad Susanto, *Teori Belajar dan Pembelajaran di Sekolah Dasar*,(Jakarta: Kencana Prenada Media Grpup,2013), hlm. 165
[39] *Ibid*., hlm. 165-166
[40] *Ibid*., hlm. 168

human will never know the types of malignancies. So, science is very important for us to learn.

d. The Objectives of Science Learning in Elementary Schools

The concept of science in elementary school is an integrated concept, because it has not separated individually, as subjects of chemistry, biology, and physics. The purpose of learning science in elementary schools in the National Board of Education Standards is intended to:

1) Obtaining faith in the greatness of God Almighty is based on the existence, beauty, and the regularity of his creation.
2) Develop knowledge and understanding of science concepts that are useful and can be applied in everyday life.
3) Develop curiosity, positive attitude and awareness of the existence of a relationship of mutual influence between science, environment, technology, and community.
4) Develop skills to investigate the nature around, solve problems, and make satisfaction.
5) Raise awareness to appreciate nature and all its regularity as one of God's creation.
6) Obtain a stock of knowledge, concepts, and skills of science as a basis for continuing education to junior high.[41]

[41] *Ibid*., hlm. 171

CHAPTER III

RESEARCH METHODS

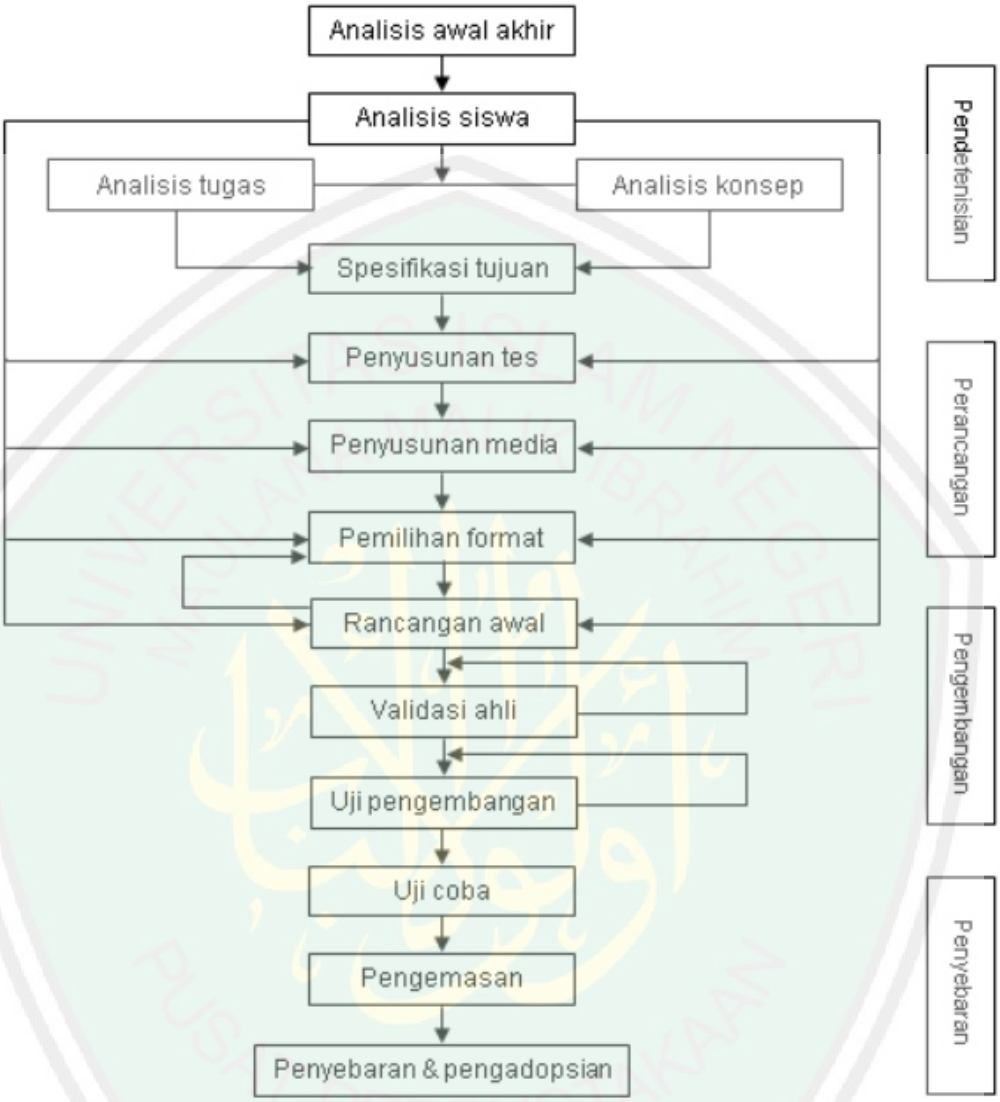
A. Method of Development

This study uses design a research and development approach (research & development/R & D). According Sugiyono, R & D is research method used to produce a particular product, and test the effectiveness of these products.[42] This method is one of the means used to develop educational products. Research and development method is widely used in the fields of natural science and engineering science. However, it is also commonly used in the social sciences such as psychology, sociology, education, management, and others.[43]

B. Model of Development

Model R & D that will be used in this research is the 4-D cycle model by Thiagarajan and Sammel. This model consists of four stages of development there are define, design, development, and disseminate.[44] However, in this study, the researchers will conduct the stages until the third stage is the stage of the development. The following lines of inquiry 4-D model of development:

[42] Sugiyono,*Metode Penelitian Pendidikan*(Bandung: Cv. Alfabeta,2008), hlm. 107
[43] *Ibid*.,hlm. 108
[44] Thiagarajan,S Dan Semmel, D.S. (1974) *Instructional Development For TrainingTeachers Of Exceptional Children: A Sourcebook.* Minneapolis: UniversityOf Minnesota.



Picture 3.1 Flow of 4-D Research & Development Model

1. The Procedure of Research and Development

The procedure of research and development explain about steps of 4-D model, there are definition phase, design phase, development phase and disseminate phase.

a. Definition Phase

The goal in this phase is to establish and define the needs in the learning process. In setting the needs of learning based on the applicable curriculum, level or stage of development of students, and school conditions. There are five basic steps in this stage, namely the analysis of problems, the analysis of the student, the analysis of concept, analysis of the task, and analysis of learning objectives.[45]

1) Analysis of the problem

The aim of this analysis is to raise and establish the basic problems at MI Khadijah in the learning of sciences on the material of light and its utilization, requiring the development of instructional materials in the form of worksheets.

Based on observations results of the learning process in the class VB and interviews with teachers of science, the learning process in schools in general are still centered on the teacher.

2) Analysis of student

Analysis of student is a study of the characteristics of the students. Characteristics of students are the overall pattern of behavior that is on the student's ability. Study characteristics of students do in class VB. At the level of primary school age, students think concretely and can make the transition from what it receives. Basically learning by engaging in a concrete and direct object will be easily captured or absorbed and more

[45] Ibid.,

durable in students' memories. The use of teaching materials that can lead students to the actual object will greatly assist students in learning.

3) Analysis of the task

Analysis of the task is a set of procedures to determine the contents of the learning unit by detailing the contents of the teaching materials in outline. The results of the analysis contained in the worksheet tasks as learning tools used in the study.

Prepared worksheets based on the Competency Standards (SK) and the Basic Competency (KD) in KTSP of Natural Sciences, for the material of light and its utilization.

4) Analysis of the concept

An identification of the main concepts to be taught and assembles systematically and linking one concept to relevant, thus forming a concept map. Basically concepts found in a map of the overall inter-related concepts. Thus, to enable students to easily understand the concepts discussed, then these concepts need to be in the sort so in accordance with the knowledge and skills that have been acquired or the learning of students at the previous meeting.

5) Analysis of learning objectives

The results of analysis of the task and analysis of the concept of task analysis is used as a reference to formulate indicators of achievement of learning outcomes and learning objectives, as the elaboration of

standards and basic competencies. The formulations of the learning objectives are the basis for designing the learning and test preparation.

b. Design Phase

This phase has the purpose to prepare prototype learning device, the steps are:

1) The selection of instructional materials

Instructional materials to be used must comply with the aim to produce products as a means of delivery of material reasoning and can improve student learning outcomes, the instructional materials is a worksheet.

2) The selection of format

Format of developed learning tools oriented to experiential learning model is the results of construction material concept from the results of experience learning by the students.

3) The design of worksheet

Preparation of preliminary design will produce a draft of worksheets which includes:

a) Title worksheets that describe the material to be poured in worksheet.

b) Determine the competency standards, and basic competence.

c) Objectives to be achieved by students after studying the material by using worksheets.

d) Procedures or activities that must be followed by the students to learn the material by using the worksheets according to the stages of

development of the concept of worksheet is the acquisition of material from the experience of learning by students.

c. Development Phase

The results of the product development stage are the translation of the design phase. The parts that have been planned in the planning stages will be arranged and designed so as to be a draft of a product in this stage.

Draft finished product then validated and assessed to two of lecturers expert of FITK consisting of materials experts and media expert, and one of science teachers in class VB as learning experts. Draft of product that has been validated to lecture expert, and will gain to teacher expert and used as input for improvement prior to field trials conducted. The results of the validation will be easier to make revisions to the draft of product. Once revised, then the product can be validated again, so get decent results for products used for field trials.

This development phase aims to generate science worksheets based experiential learning on material of light and its utilization is valid.

1) Validation of lecturers expert followed by revision

   Assessment worksheet of lecture expert on an assessment instrument validation

2) Validation of teachers

   Based on the evaluation of teachers, get a suggestions or input on development of worksheet.

3) Trials with the students

Testing with use of worksheets in science learning material of light and its utilization will be do in MI Khadijah Malang on VB class. The purpose of the trial is to operationalize worksheets and the learning tools. The results of this trial will be used as input or improvement the finally of worksheets. Field trials, in addition to the final product is intended to operationalize the worksheet, also to know the results of the application of worksheets in science learning on material properties of light and its utilization, including the validity, effectiveness and attractiveness of the worksheets as well as an increase in the cognitive achievement of students.

C. Product Trial

The test product is intended to collect data that can be used as a basis for establishing the validity, effectiveness, and attractiveness of the product. Some of the activities carried out to test the development of this research include:

1. Trial Design

The trial design is done in order to determine the level of the validity attractiveness, and effectiveness of the product. Products tested the level of validity, effectiveness and attractiveness. Level of validity, effectiveness and attractiveness of instructional materials known from the results of analysis trial activities through several phases:

a. Validation by material expert.

Validation of matter expert by lecture who experts in the natural sciences. Validation of this matter experts aims to determine of worksheet that use

of the student is accordance with the learning material contained in SK, KD and indicators that have been made. Researcher develops of assessment aspects in accordance with the product. Procedure of assessment by matter expert using the following steps:

1) Determine the assessment of indicators that suitable to the development of product.
2) Develop an instrument validation based on indicators that have been made by the developer.
3) Doing validation of worksheets from results of the development to material experts.
4) Conduct an analysis of the results of validation scores obtained by converting into a statement of quality.

b. Validation by media experts.

Validation by media expert is to determine whether worksheet feasible to use students in learning. Aspects of quality assessment of worksheets determined according to the terms of the preparation of worksheets that didactic requirements, construction, and technical.

Procedure of assessment by media expert using the following steps:

1) Determine the assessment indicators that suitability to the development of product.
2) Develop the instruments of validation of worksheet results based on the development of indicators that have been made by the developer.
3) Doing validation of worksheet

4) Conduct an analysis of the results of the validation scores obtained by converting into a statement of quality. Developers make improvements based on advice and results of analysis.

c. Validation by learning experts

Validation of learning expert is conducted by teacher of science lesson. Validation of learning expert aims to known whether the worksheets that will be use is accordance with the learning material contained in SK, KD and indicators that have been made. Researcher develops the aspects of assessment accordance with the product. Learning expert assessment procedure by using the following steps:

1) Determine the assessment of indicators that suitability to the development of products.
2) Develop an instrument validation based on indicators that have been made by the developer.
3) Perform of validation of worksheets results from the development to learning experts.
4) Conduct an analysis of the results of the validation scores obtained by converting into a statement of quality.

d. Field trial

Field trial that applied to the student in class VB amounting to 23 people. The purpose of the field trials is to operationalize of the worksheets and the learning tools.

The procedure of field trial is as follows:

1) Explain to students the purpose trialing of products.
2) Hold a pre-test before using the worksheets.
3) Conduct learning with use the student worksheets.
4) Conducting post-test after using worksheets.
5) Developer shares the questionnaire to known the attractiveness and the effectiveness after using the worksheet.
6) Analyze the results of pre-test and post-test by looking at student achievement at a predetermined of KKM.
7) Analyze the results of the student's answers on the questionnaire to see the advantages and disadvantages of worksheet.

2. Subject Trial

Subject trial in this study is the matter expert, media experts, teachers of science and students of class VB MI Khadijah Malang. The condition of the subject of this study can be explained that is a student who has a character quite complex, so need a learning that can enable students. The approach is suitable that use in science learning in MI Khadijah Malang is Experiential Learning model, because very such activities that capable to directing students to be active and independent.

Here's an explanation related to the subject of the trial:

a. Matter Expert

Matter expert is an expert lecturers who master of the matter of science, especially of the light and its utilization and master of the material

that associated with the experiential learning models. The qualified of expert in the research and development are:

1) Mastering the material characteristics of science, especially in the material of light and its utilization.
2) Having knowledge of science related to the product will be development.
3) Willing as tester of science instructional materials in class VB MI Khadijah Malang.

b. Media Expert

A media expert who is basically having the same criteria as matter experts but media experts should is a people who have the ability in the instructional design.

c. Learning Expert

Learning experts is one of the testers of level of validity from the science instructional materials based on experiential learning with the following qualifications:

1) Teachers are teaching in elementary school.
2) Have experience in teaching science.
3) Willing as testers and users of the instructional materials for the source of the data from the development results.

d. Field Trial

The field trials were taken from students of class VB MI Khadijah Malang, amounting to 23 students.

3. Type of Data

Based on the purpose, this research and development, the data obtained consists of two types of data there are:

a. Qualitative Data

At trial of matter expert, media expert, learning expert and subject teachers of qualitative data derived from criticism, suggestions, and comments from subject matter experts trials, learning and media expert teachers field study of the materials. While in field trials, qualitative data derived from answers to the subject field trials at the time of filling worksheet.

b. Quantitative data

Quantitative data of the point rating given by a subject of matter expert testing, learning media expert and subject teachers to the worksheet and subject of the field trials of textbook in accordance with the judgment given.

4. Instrument Data Collection

The details of the research instrument used to collect the data in the trial, as follows:

a. Questionnaire

Questionnaire as product assessment form used to obtain data on the feasibility worksheet development results in terms of aspects of validity, effectiveness and attractiveness. The questionnaire was intended for matter experts, media experts, learning experts and

student. Preparation of the instrument is based on the grid. Questionnaire sheet refers to the requirements of didactic, construction and technical. Questionnaire prepared using a Likert scale.[46]

b. Achievement test

Researchers use formative tests to determine assessment of student after using the worksheets. Task of the test have a scores that vary depending based on the degree of difficulty.[47]

c. Interview

Interviews conducted for teachers, principals and students in a structured, meaning that researchers have prepared questions before doing the interview. Questions prepared by grating the interview.[48]

5. Data Analysis Techniques

This research and development used three analysis techniques, such as analysis of learning content, descriptive analysis, and analysis of test results.

a. Analysis of Learning Content

Analysis of content is done by formulating learning goals tailored to the SK-KD to arrange the contents of development of instructional materials. The results of this analysis are used as basic to development of science instructional materials based on experiential learning.

[46] Sugiyono,*op.cit.*, hlm. 95
[47] Nana Sudjana,*Penilaian Hasil Proses Belajar Mengajar* (Bandung: Remaja Rosdakarya,2005), hlm. 29.
[48] Sugiyono,*op.cit.*, hlm. 97

b. Descriptive Analysis

This analysis is done at the time of trial, the data collected from the assessment questionnaire to provide feedback, suggestions, and feedback of improvements.

The results of this descriptive analysis are used to determine the level of validity, effectiveness, and attractiveness of the worksheet, to analyze the results of the response of the validator using the following formula:[49]

$$P = \frac{\sum X}{\sum X1} \times 100\ \%$$

Specification:

P: Percentage of validity

ΣX: The total number of scores answers validator (real value)

ΣXi: The total score of the highest response (expected value)

Assessment of the results of validation using scale conversion rate of achievement, because the necessary assessment standards of achievement and adjusted to the predefined categories. The following table qualification assessment:

Table 3.1 Qualification of Validity Level Based on Percentage[50]

Achievement level	**Qualification**	**Information**
80 – 100%	Valid	No revision
60 – 79%	Quite Valid	No revision
40 – 59%	Less Valid	Revision
0 – 39%	Not Valid	Revision

[49] Arikunto, *Dasar-dasar Evaluasi pendidikan* (Jakarta; Bumi Aksara, 2003).hlm.313

[50] B. Subali, dkk, *Pengembangan CD Pembelajaran Lagu Anak UntukMenumbuhkan Pemahaman Sains Anak. Jurnal Pendidikan Fisika Indonesia*, prodi Fisika UNNES No.8, Januari 2012

Based on the table, the assessment is valid the scores ranging from 60-100 of all elements contained in the assessment questionnaire matter experts, media experts, learning exerts, and students. The assessments must meet the criteria of valid. If the criteria are not valid then be revised, to achieve a valid criterion.

c. Analysis of Test Results

Data analysis results of tests used to measure comparison of student learning outcomes, in field trials conducted using experiments by comparing the situation before and after the use of new teaching methods (before-after).[51]

Here's an explanation associated with experimental models of before-after:

Picture 3. 2 Designs of Experiments (Before-After)

Specification:

O1: Value before treatment

O2: Value after treatment

X: Treatment

The data of field trial collected using questionnaires and achievement tests. The data of field trial was then collected using a

[51] Sugiono, *op.cit.*, hlm. 414.

pre-test and post-test to know the comparison of results of field trials, to calculate the level of the comparison, as the following:[52]

1) Mean (average)

The analysis technique used to determine the mean pre-test and post-test with the following formula:[53]

$$\text{Mean} = \frac{\sum X}{N}$$

Specification:

Mean : Average

ΣX : the amount of the value of pre or post-test

N : number of samples

[52] Subana, dkk, *Statistik Pendidikan,*(Bandung : Pustaka Setia, 2005), hlm. 131-132
[53] Zen Amiruddin, *Statistik Pendidikan Pendidikan*, (Yogyakarta:Teras, 2010), hlm.73

CHAPTER IV

THE RESULT OF RESEARCH

Development of science instructional materials of worksheets based experiential learning to subject of light and its utilization for 5th grade in MI Khadijah Malang according to stages of 4-D development models (Four D Models). The results of development of the worksheet based experiential learning includes several steps there are:

A. Definition Phase

The goal in this phase is to establish and define the needs in the learning process. In setting the needs of learning based on the applicable curriculum, level or stage of development of students, and school conditions.

1. Analysis of the problems

Data obtained from the analysis of the problems among others are the curriculum that implemented in class VB in year 2014/2015 is curriculum SBC. Material that is considered difficult by students in learning science is the material of light and its utilization. Student difficulties in understanding the light, especially to understanding of the virtual image and the difference with the real image, the students also difficult to provide examples of the application and utilization of the light in everyday life.

Understanding and knowledge which is obtained students is different with the explanations of teacher, this is called the miss

communication between students and teachers. Therefore, the use of instructional materials that can facilitate student's understanding and attractive to students. Worksheets expected to be the solution of the problems in the learning process.

2. **Analysis of students**

Characteristics of VB graders who the subject of trials are 10-11 years old, the student's ability of academic is different, views of the value of the task and daily tests in science lessons. There are students with high academic ability, medium and low. Students is very active to finish the task that given by the teacher. Students have received the material of light and its utilization, but the student's understanding of the material is still low.

3. **Analysis of the task**

The tasks set by the teacher in the basic competencies to describe of light and create work/models that utilize of light are in the form of questions and essay description, slightly provide practice questions. In addition, teachers also give the task a command to create a poster about the material taken from books and worksheets that are used in schools.

4. **Analysis of the concept**

Basic competencies describe the light and create a work or models that utilize of the light in the standard of competence to apply the light through making something work or model consists of two sub subject matter, namely the light and the utilization of the light through making a

work or a model. Material that is considered difficult by the students served in the instructional materials in accordance with the curriculum SBC.

5. **The formulation of the learning objectives**

The learning objectives formulated includes 2 sub material, the light and the utilization of light through making a work or a model.

The formulations of the learning objectives are as follows:

a. Students are able to demonstrate the light on various objects (clear, colored, and dark) through a simple experiment
b. Students are able to describe the light on flat and curved mirrors (convex or concave) through a simple experiment
c. Students are able to show examples of light refraction events in everyday life through experiments.
d. Students are able to show proof that white light is composed of various colors through experiments.
e. Students are able to give examples of events decomposition of light in everyday life through simple experiment.
f. Students are able to design a simple model of the periscope and lenses through experiments.
g. Students are able to make a periscope and a simple lens is by design of materials that exist in the surrounding environment through experiments.

h. Students are able to create reports from result of test periscope and simple lens models through a simple experiment.

B. Design Phase

This phase will produce the instructional materials of science worksheets based experiential learning before to validation. The steps in this phase are:

1. Preparation of material and task

The material is arranged in science-worksheets based experiential learning consist of one subject, there is the light and its utilization. The subject is include of two sub-materials are the light and its utilization in everyday life.

Worksheets based experiential learning is equipped with a variety of activities, there are including discussion, reasoning, observing, and experimenting. These activities are used to increase the learning experience of student in building and deepen the concept of matter. In this worksheet are also an independent test at each end of the sub materials, and the task of evaluation and reflections at the end of the material that is used to determine the level of student understands of the material.

2. Preparation of media formats and initial design

Instructional materials that have made the development are science worksheets for subject of light and its utilization for grade VB in MI Khadijah Malang. This worksheet can be viewed through four aspects,

there are the pre-introduction, introduction, content, and complementary parts. Following exposure to the product description:

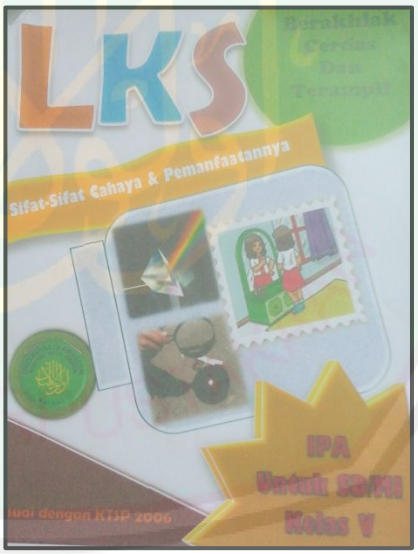
a. Pre-introductory section

This section includes a cover, foreword, excellence of book, the basic of Qur'an about Light and its Utilization, SK, KD, and indicators, table of contents, and map concept. Following explanation:

1) Cover

Cover in the science worksheets based experiential learning has two parts: the front cover and back cover. Here iss the explanation:

a) Front Cover



Picture 4. 1 Front cover

Front cover of worksheet consist of title worksheets tailored to the subject entitled "The Light and its Utilization", background of worksheet tailored with the content, intended that the reader is able to know the meaning of the title before opening the

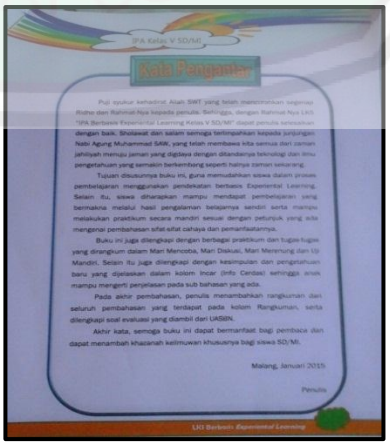
contents of the worksheet and also included agencies of developers located at the bottom.

b) Back Cover

Back cover has a different meaning to the front cover; back cover dominated by the delivery of the meaning of the contents of LKS and explanation of global contains associated with the worksheets are made.

Picture 4. 2 Back Cover

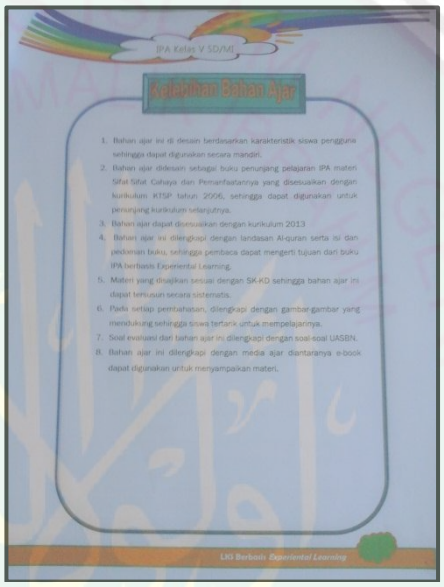
2) Foreword



Picture 4. 3 Foreword

Foreword is a series of words that form of speech gratitude to Allah SWT, the goals of formulation the worksheets based experiential learning, explanations related to the contents of the book, and the authors hope.

3) Excellence of Worksheet

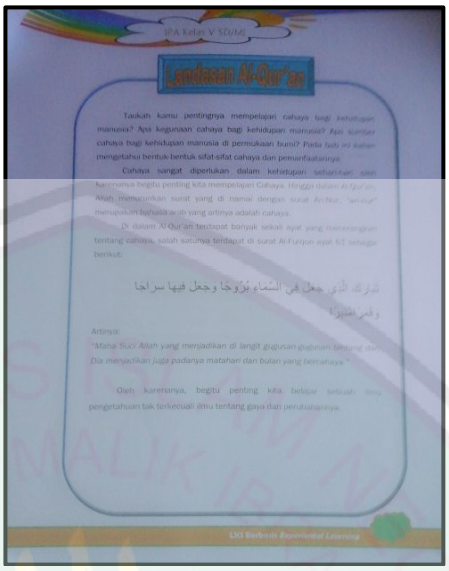


Picture 4. 4 Excess of Worksheets

The advantage of worksheet is explained of differences of worksheet based experiential learning between other instructional materials.

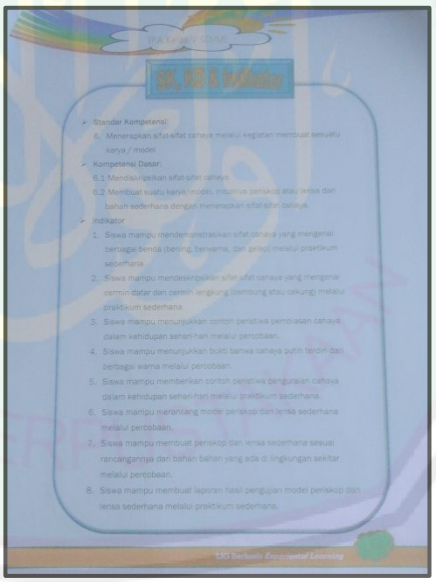
4) The Qur'an about The Light and its Utilization

On the pages of the Qur'an foundation, includes verses pertaining to the material.



Picture 4. 5 Foundation of Al-Quran

5) SK, KD and Indicators



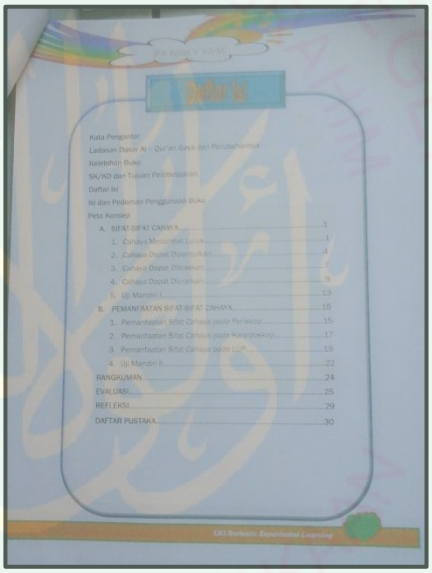
Picture 4. 6 SK, KD & Indicators

Includes an explanation of the standard of competence, basic competence, and achievement indicators are used as a reference in the implementation of learning activities. SK, KD, and this indicator are taken from government regulation No. 22 about the

content standards for elementary education units. Hence the need for the achievement of each item clearly.

6) Table of Contents

The table of contents is lists the chapters and sub-chapters will be discussed on pages and included a list of all parts of the pages contained in the materials, so that readers easily find the subject of the search.



Picture 4. 7 Table of Contents

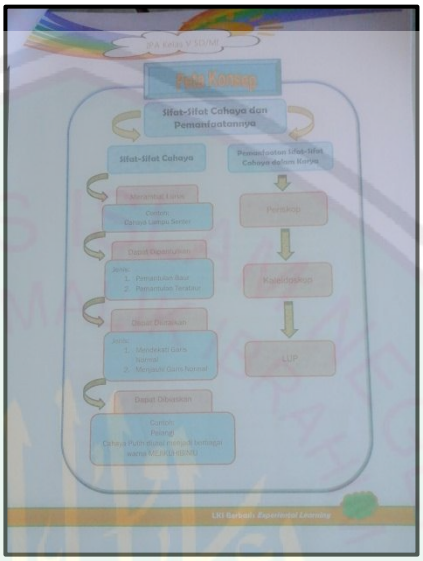
b. Introduction

Introduction section is located at the beginning of learning activities and aims to provide information related to the material to be learning and the learning objectives to be achieved. Introduction section consists of:

1) Map of Concept

Maps of concept in order for the reader easily understand the material, but it can be interpreted as a diagram that relation

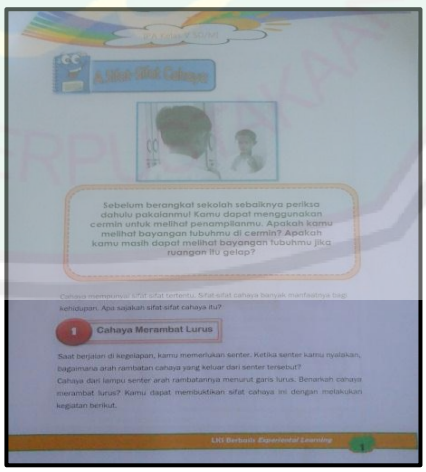
between concepts to represent learning. Map of concept have a structure as well as the general phrase to be special.



Picture 4. 8 Map of Concept

2) The Title of Chapter

The title of chapter have purpose to determine the material to be learned.

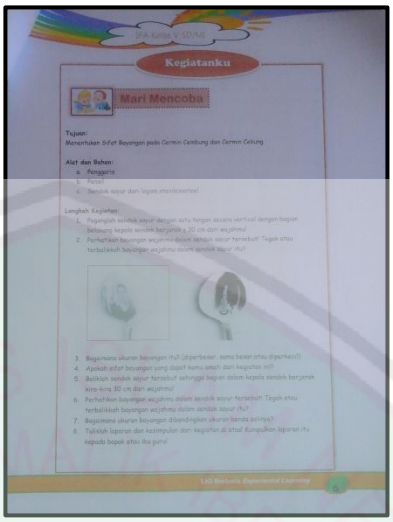


Picture 4. 9 The Title of Chapter

c. Section of Contents

Parts of the contents are:

1) My Activity

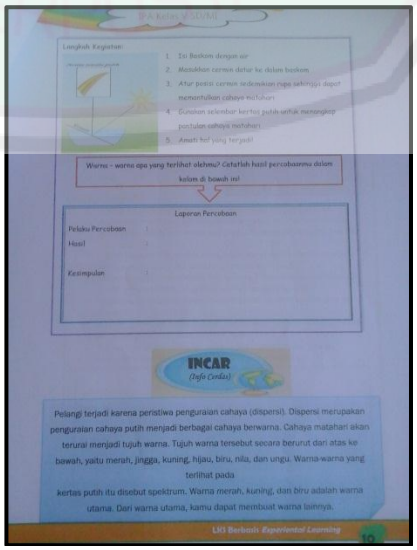


Picture 4. 10 My Activity

Contain of my activity are discussions, observation and experiment, so that the students get experience of learning from such activities as the basis of developing the concept and knowledge of students about the material.

2) Incar (smart info)

Incar in this worksheet include the conclusions and additional knowledge of the results of my activities and explanation of material.



Picture 4. 11 Incar

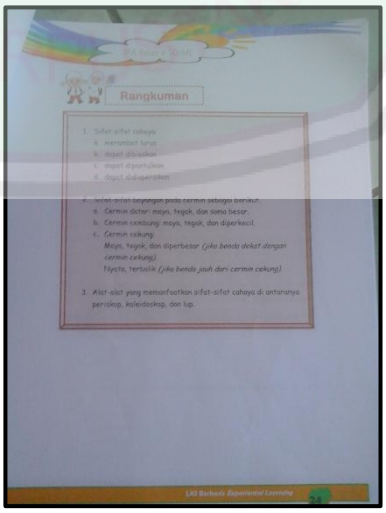
3) Self-Test

Independent exercises in each the end of the sub material to test the level of student's understanding of the material that has been described.

Picture 4. 12 Self-Test

4) Summary

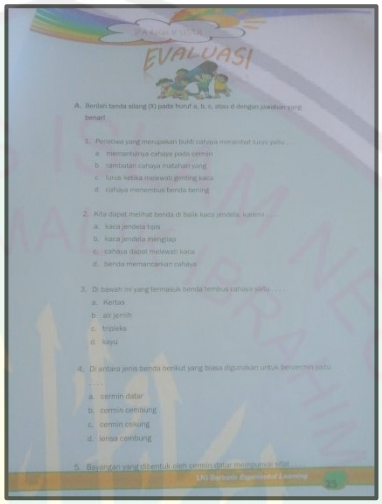
This column contains about important of concepts are summarized to help students recall what they have learned.



Picture 4.13 Summary

5) Evaluation

This evaluation column, contains exercises that can be used to test the student's understanding



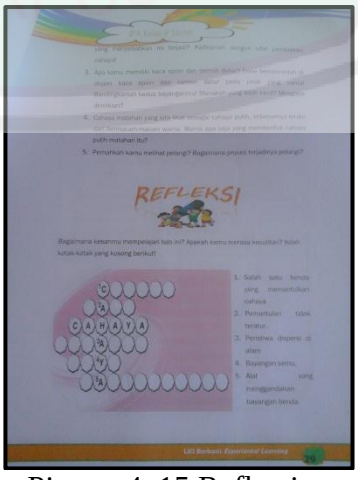
Picture 4. 14 Evaluation

d. Complementary Section

The following components complementary parts:

1. Reflection

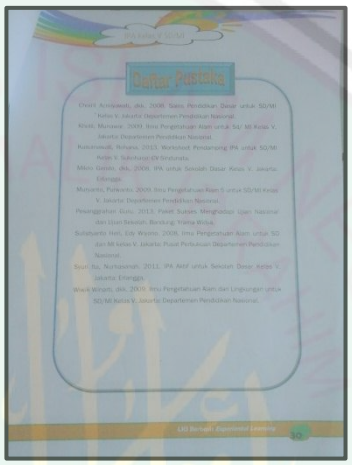
Reflection contains are additional problems such as crossword puzzles to reflect the results of the evaluation.



Picture 4. 15 Reflection

2. Bibliography

Bibliography contains a source of reference taken by authors from various sources, as reinforcement and as evidence that the teaching material has a basic of rationale.



Picture 4.16 Bibliography

C. Development Phase

The development phase consists of:

1. Validation of Product

The data from validation of worksheet is taken starting on March 23, 2015 and ended on April 8, 2015, the data retrieval through the results of validation and field trials. The data retrieval obtained from three validator, consisting of a validator matter experts is Agus Mukti Wibowo, S.Pd who is the lecturer of PGMI, FITK UIN Maulana Malik Ibrahim Malang, a validator media expert is Nurul Yaqin, M.Pd chairman in Islamic Education Management Department, FITK UIN Maulana Malik Ibrahim Malang, and a validator learning expert is Wiwit Sri Widayati,

S.Pd teachers of science learning in MI Khadijah Malang. The following of scoring criteria are used values in the validation process are:

Table 4. 1 Criteria of Scoring by Matter Expert, Media Expert, Learning Expert, and Students of Class VB

Answer	Information	Score
SB	Very good	4
B	Good	3
TB	Not Good	2
STB	Very Not Good	1

Presentation of the data from the analysis of a questionnaire assessment of matter expert, media experts, and learning experts, are as follows:

a. Validation of Matter Expert

Developing a product that is delivered to the subject matter experts is in the form of worksheets. Exposure of descriptive from the results of matter expert will be shown through the questionnaire method with questionnaires that can be seen in the table 4.2, 4.3, 4.4, 4.5.

1) Exposure of The Quantitative Data

Quantitative data can be seen in table 4.2, 4.3, as follows:

Table 4. 2 The Results of Assessment of Matter Expert

No.	Statement	x	xi	P (%)	The Level of Validity	Info
1.	Suitability formulation of the topic on the development of teaching materials.	4	4	100	Valid	No Revisions
2.	Suitability of the material presented on the development of teaching materials.	4	4	100	Valid	No Revisions
3.	Suitability Competency Standards with the	4	4	100	Valid	No Revisions

	indicator.					
4.	Suitability indicators are presented with basic competency.	4	4	100	Valid	No Revisions
5.	Suitability systematic description of learning content.	3	4	75	Quite Valid	No Revisions
6.	Clarity exposure to the material.	4	4	100	Valid	No Revisions
7.	The accuracy of the material presented to provide motivation to the students.	4	4	100	Valid	No Revisions
8.	Suitability summary of the material with the discussion.	3	4	75	Quite Valid	No Revisions
9.	The accuracy of evaluation instruments that can be used to measure student's abilities.	4	4	100	Valid	No Revisions
10.	Ease language used in teaching materials.	4	4	100	Valid	No Revisions
Amount		**38**	**40**	**95%**	**Valid**	**No Revisions**

a) Data Analysis

Analysis based on the quantitative data by matter experts. The next step is to analyze the data, can be calculated by the percentage level of achievement, the following explanation:

$$P = \frac{\sum x}{\sum x1} \times 100\ \%$$

Specification:

x : Score of answers from the validator, by Mr. Agus Mukti Wibowo, S.Pd as a matter experts.

xi : Score of the highest response.

P : The percentage of validity level.

Table 4.3 Frequency of Validity Level by Matter Expert

Validity level	F%	%
Valid	8	80
Quite Valid	2	20

Table 4.2, and 4.3, indicating that the results of validation by matter experts is 80% and stated valid, there are in the item 1, 2, 3, 4, 6, 7, 9, 10, while 20% stated of quite valid, there are on items 5 and 8.

2) Exposure of Qualitative Data

Here is exposure of qualitative data collected from criticism and suggestions by matter experts that can be seen in Table 4.4:

Table 4. 4 Suggestions and Criticism by Matter Experts

Name of Matter Expert	Suggestions and Criticism
Agus Mukti Wibowo, M.Pd	1. The letters in the worksheet to be examined again because there are some wrong. 2. Draw on the book clarified 3. Propagated again the example that suitable with everyday life. 4. Evaluation be examined again because there are several possible answers are ambiguous. 5. Can be used for research.

According to the table of criticism and suggestions, has written that there are several aspects that need to be revision for consideration whether the product is valid to use or not and as enhancements of the product so that it can be more qualified, in the improvement of worksheets is need of one time to revise.

Validation of matter experts conducted on March 27, 2015 by Mr. Agus Mukti Wibowo, S.Pd, in the process of validation with matter experts, researchers have conducted consultation about worksheet with the advisor who is Mr. Dr. M. Zainuddin, M.A

3) Revision of The Product

Table 4. 5 Revision of the Worksheet Based on Validation of Matter Expert

No.	Point	Before Revision	After Revision
1.	Posts in worksheet to be examined again because there are some wrong.	The use of capital letters and the point does not fit on the box of Incar page 3	Sentences, letters and punctuation marks in the box of Incar page 3 have been adjusted to correct of EYD rules.
2.	Pictures in the book clarified	In worksheet page 2, experiment picture is less clear	On page 2 images experiments already clarified and enlarged.
3.	Reproduced again the example according with everyday life.	In worksheet page 7, an example of the application of the light that is on the flashlight	Examples of the application of the properties of light in flashlight, rearview of car and motorcycle, lights on cars and motorcycles
4.	Evaluation questions examined again because there are several possible answers were ambiguous.	In the worksheet page 25, evaluation questions section A multiple choice no. 2 and 3, the choice of an ambiguous answer.	Ambiguous answer choices have been replaced

All data from the results of the reviews, assessments, and comments and suggestions from matter experts are used to the basis material for revision. It is useful for the improvement of science worksheet based experiential learning before trial to students of VB grade.

b. Validation of Media Expert

Exposure of descriptive results of the validation by media experts on the product of science worksheets at fifth grade for subject of the light and its utilization based on experiential learning through is indicated through questionnaire method with questionnaires that can be seen in table 4.6, 4.7, 4.8, 4.9.

1) Exposure of Quantitative Data

Table 4. 6 The Assessment of Media Expert

No.	Statement	x	xi	P (%)	The Level of Validity	Info
1.	Cover in accordance with the contents of the material.	4	4	100	Valid	No Revisions
2.	Typeface used in accordance with students of MI in fifth grade.	4	4	100	Valid	No Revisions
3.	Font size used in accordance with students of MI in fifth grade.	3	4	75	Quite Valid	No Revisions
4.	The images on the books in accordance with the material.	4	4	100	Valid	No Revisions
5.	The images used to attract students.	3	4	75	Quite Valid	No Revisions
6.	The layout of the image on the book is interesting.	3	4	75	Quite Valid	No Revisions
7.	Pictures on the book, near to student life.	4	4	100	Valid	No Revisions
8.	The size of the image on the book is suitable.	4	4	100	Quite Valid	No Revisions
9.	Consistent color book.	3	4	75	Quite Valid	Not Revisions
10.	Layout on the book is interesting.	4	4	100	Valid	No Revisions
Amount		**36**	**40**	**90%**	**Valid**	**No Revisions**

a) Data Analysis

Based on the results of the quantitative data validation by media experts, the next step is to analyze the data, can be calculated by the percentage of achievement level, the following explanation:

$$P = \frac{\sum X}{\sum X1} \times 100\ \%$$

Specification:

x : Score answers from the validator, by Mr. Nurul Yaqin as a media expert.

xi : Score of the highest response.

P : The percentage of validity level.

Table 4. 7 Frequency of Validity Level by Media Experts

Validity level	F%	%
Valid	6	60
Quite Valid	4	40

Seen from the table 4.7, and 4.8, indicating that the result of validation by media experts is 60%, stated valid , there are on items 1, 2, 4, 7, 8, 10, while 40% stated quite valid, in the item 3, 5, 6, 9.

2) Exposure of Qualitative Data

Table 4. 8 Suggestions and Criticism by Media Experts

Name of Media Expert	Suggestions and Criticism
Nurul Yaqin, M.Pd	1. Do not give the box if not needed. 2. Try images fused with the book. 3. Colors in the book a maximum of 3, according to the standard. 4. Equated Font size

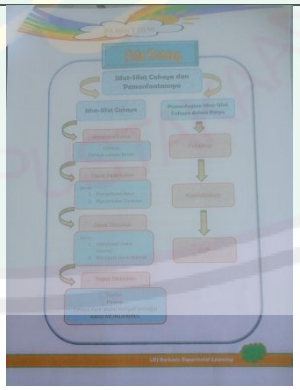
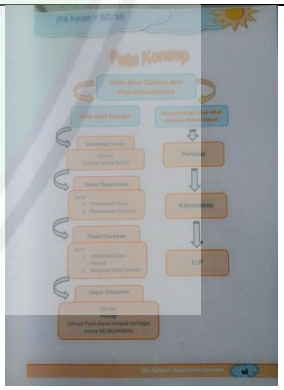
	5. Uniformity used font in the sub-sub-headings

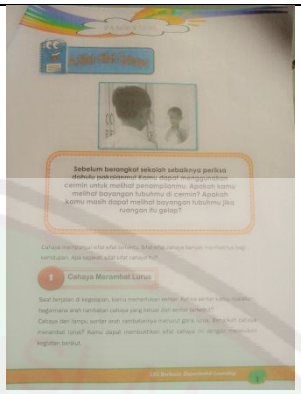
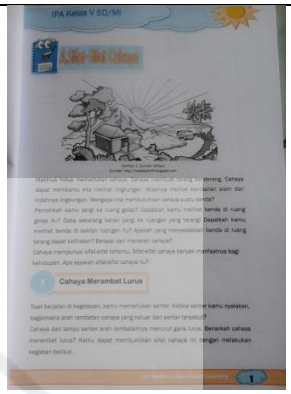
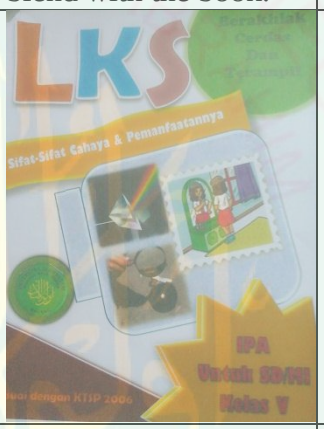
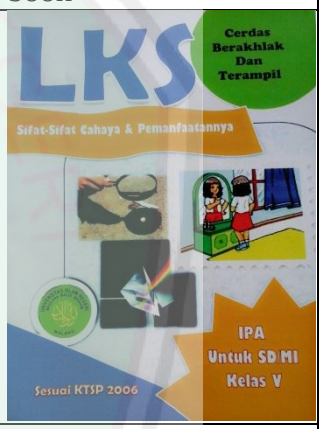
Based on the table of criticism and advice, has written that there are several aspects that need a refinement to become more qualified. This worksheet of one time revises. On April, 1, 2015 the revise starting from changing the composition of color that does not seem excessive, spruce the image, and adjust the font with the characteristics of student.

3) Revision of Product

Based on the analysis conducted, following exposure to the data about the revision of worksheet:

Table 4. 9 Revision Based on the Validation by Media Experts

No.	Point	Before Revision	After Revision
1.	Do not give the box when not needed.	 In the introduction, contents and complementary in the given box.	 Box in the introduction, contents and complementary eliminated

2.	Try to picture fused with a book.	 Some pictures on the worksheet do not blend with the book.	 The picture changed, so the looks fused with book
3.	Color at books a maximum of 3, in accordance with the standards.		
4.	Font size, equated	Using font size 10 on my activities column and font size 12 on Incar.	Using font size 12 in all parts of LKS
5.	Uniformity use of fonts in subtitles	Using comic sans font on my activities column. Using franklin gothic book font on Incar, Evaluation, and Summary	Using franklin gothic book font in all parts of the worksheet, except the title of the chapter.

All data from the results of review, assessment, and criticism and advice from media expert are as a basis for revision. It is useful for the improvement of science worksheet based experiential learning before trials in VB grade.

c. Validation of Learning Expert

The Product that submitted to learning experts is in the form of worksheets. Exposure of descriptive result of validation by learning experts is shown through questionnaire method with questionnaires that can be seen in Table 4.10, 4.11, 4.12.

1) Exposure of Quantitative Data

Quantitative data can be seen in Table 4.10, 4.11, as follows:

Table 4. 10 Assessment of Learning Expert

No.	Statement	x	xi	P (%)	The Level of Validity	Info
1.	Suitability formulation of the topic on the development of teaching materials.	4	4	100	Valid	No Revisions
2.	Suitability of the material presented on the development of teaching materials.	3	4	75	Quite Valid	No Revisions
3.	Suitability Competency Standards with the indicator.	4	4	100	Valid	No Revisions
4.	Suitability indicators are presented with basic competency.	4	4	100	Valid	Not Revisions
5.	Suitability systematic description of learning content.	3	4	75	Quite Valid	No Revisions
6.	Clarity exposure to the material.	3	4	75	Quite Valid	No Revisions
7.	The accuracy of the material presented to provide motivation to the students.	4	4	100	Valid	No Revisions
8.	Suitability summary of the material with the discussion.	4	4	100	Valid	No Revisions
9.	The accuracy of evaluation instruments that can be used to measure student's abilities.	4	4	100	Valid	No Revisions
10.	Ease language used in	4	4	100	Valid	No

	teaching materials.					Revisions
Jumlah		**37**	**40**	**92, 5%**	**Valid**	**No Revisions**

a) Analysis of The Data

Based on the quantitative data, the results of validation by learning expert is continue the next step is to analyze the data, so it can be calculated by the percentage of achievement level, the following explanation:

$$P = \frac{\sum X}{\sum X1} \times 100\ \%$$

Specification:

x : Score answers from the validator, by Mrs. Wiwit Sri Widayati, S. Pd as a science learning expert.

xi : Score the highest response.

P : The percentage of validity level.

Table 4. 11 Frequency of Validity Level by Learning Expert

Validity level	**F**	**%**
Valid	7	70
Quite Valid	3	40

Seen from the table 4.11 and 4.12, shown that the data of the result of validation by learning experts is 70% stated valid, on items 1, 3, 4, 7, 8, 9, 10. While 30% stated quite valid, in items 2, 5, and 6.

2) Exposure of Qualitative Data

Here is exposure of qualitative data collected from criticism and suggestions by learning experts that can be seen in Table 4.12.

Table 4. 12 Suggestions and Criticism of Learning Expert

Name of Learning Expert	Suggestions and Criticism
Wiwit Sri Widayati, S.Pd	1. Example of application the light that propagated 2. The explanation of concept from material should be added 3. The picture on book was given the source 4. Teaching material is good and interesting.

According to the table of criticism and advice, has written that there are several aspects that need to be revise as improvement of the product, the improvement of worksheet requires one time revise. The data was taken on April 3, 2015, the same time doing research and product trials on April 7, 2015 because has approval from the validator experts, the advisor and learning expert has been allowed to do research because the worksheet is valid to be testing based on the criteria of questionnaire, opinions, criticism and advice from validator experts.

Validation by learning experts who is Mrs. Wiwit Sri Widayati, S.Pd, she only suggested that "the example of application of light propagated, so that more students can understanding the concept, overall the worksheet is good and interesting". All data from the result of the reviews, ratings, criticism and advice from learning expert is use

as a basis for revision and refinement to improvement of components of worksheet before testing in class VB

2. Field Trial

The level of effectiveness and attractiveness of the worksheet take from the results of field trials on April 7, 2015 and April 9, 2015. The products that tested in the field in the form of science worksheets based experiential learning that have been validated by several experts, and stated eligible to apply to students. Field trial conducted by all students in the class VB MI Khadijah Malang, amounting to 23 students. The following of exposure data of trial result:[54]

a. Exposure of Quantitative Data of Field Trials

Following exposure of quantitative data field trial results on the table 4.13:

Table 4. 13 The Results of Field Trial

No.	Statement	Scores Obtained from Respondents Students Absent No.1-23	$\sum x$	$\sum x_i$	P (%)	The Level of Validity	Info.
1.	The worksheet can help students to learn	4,4,4,4,4,4,4,4 ,4,4,4,4,4,4,4, 4,4,4,4,4,4,4,4	92	92	100	Valid	**No Revisions**
2.	The worksheet can encourage students to learn	4,4,4,4,4,4,4,4 ,4,4,4,4,4,4,4, 4,4,4,4,4,4,4,4	92	92	100	Valid	**No Revisions**
3.	The worksheet easier for students to understand the Natural	4,4,4,4,4,4,4,4 ,4,4,4,4,4,4,4, 3,4,4,4,4,4,4,4	91	92	98,9	Valid	**No Revisions**

[54] Benny A. Pribadi, *Model Desain Sistem Pembelajaran*. (Jakarta: Dian Rakyat, 2009),hlm.107-108

	Sciences.						
4.	Task on the worksheet relatively easy.	3,3,3,4,4,2,4,4 ,4,4,4,4,4,3,4, 4,4,3,3,3,3,3,3	80	92	86,9	Valid	**No Revisions**
5.	Type and size of letters contained in the worksheet is easy to read.	4,4,4,4,4,4,4,4 ,4,4,4,4,4,4,4, 4,4,4,4,4,4,4,4	92	92	100	Valid	**No Revisions**
6.	The language used in the worksheet can be understood.	4,4,4,4,4,4,3,4 ,4,4,4,4,3,4,4, 4,4,4,4,4,4,4,4	90	92	97,8	Valid	**No Revisions**
7.	During this study the worksheet; students do not see the words that are difficult.	4,4,4,4,4,4,4,4 ,4,4,3,4,4,4,4, 4,4,4,4,4,4,4,4	91	92	98,9	Valid	**No Revisions**
8.	During use the worksheet, students do not need the help of others people like friends, teachers, or parents to learn.	2,2,2,3,3,3,2,3 ,4,4,3,3,3,3,4, 4,4,4,3,4,4,4,4	75	92	82	Valid	**No Revisions**
9.	The worksheet is attractive to learn.	4,4,4,4,4,4,4,4 ,4,4,4,4,4,4,4, 4,4,4,4,4,4,4,4	92	92	100	Valid	**No Revisions**
10.	The worksheet can increase the motivation to learn	4,4,4,4,4,4,4,4 ,4,4,3,4,4,4,4, 4,4,4,4,4,4,4,4	91	92	98,9	Valid	**No Revisions**
Amount			**886**	**920**	**96,3 %**	**Valid**	**No Revisions**

Specification:

Name of Respondent:

1. Graders of VB in MI Khadijah namely Adina Rosa Hana
2. Graders of VB in MI Khadijah namely Akmal Rizal
3. Graders of VB in MI Khadijah namely Alfriz Nurvauziyah C.
4. Graders of VB in MI Khadijah namely Balamah Basyasyah
5. Graders of VB in MI Khadijah namely Candra Kurniawan
6. Graders of VB in MI Khadijah namely Faldo Yeri Sevanisa

7. Graders of VB in MI Khadijah namely Fatahillah Thabit Fatoni
8. Graders of VB in MI Khadijah namely Iga Noventa
9. Graders of VB in MI Khadijah namely Kameralda Naurah
10. Graders of VB in MI Khadijah namely Moch Patra Maulana
11. Graders of VB in MI Khadijah namely Muhammad Nawfal
12. Graders of VB in MI Khadijah namely Mohammad Nawfal Musyafa
13. Graders of VB in MI Khadijah namely Muhammad Ridho
14. Graders of VB in MI Khadijah namely Najah
15. Graders of VB in MI Khadijah namely Nandita Auralia
16. Graders of VB in MI Khadijah namely Nasywa Alf Putri
17. Graders of VB in MI Khadijah namely Oka Luman Aryaguna
18. Graders of VB in MI Khadijah namely Phalosafa Ghassani Zakirah
19. Graders of VB in MI Khadijah namely Rahil Kamilia Sa'idah
20. Graders of VB in MI Khadijah namely Ruri Kamaruzzaki
21. Graders of VB in MI Khadijah namely Shakyla Irsya Faradisa
22. Graders of VB in MI Khadijah namely Sulthan Rofiq Rabbani
23. Graders of VB in MI Khadijah namely Yanuar Taef Chalil

a) Data Analysis

Quantitative data is obtained from field trial in Table 4.13; the next step is analysis of the data. Here is percentage of achievement level of field trials:

$$P = \frac{\sum X}{\sum X1} \times 100\ \%$$

Specification:

x : Score of answers by graders VB in MI Khadijah

xi : Score of the highest answer.

P : The percentage of validity level.

The percentage of field trials was 96.3% and can be seen in table is 4 scale conversions that is at valid so that this worksheet does not need to be revise.

3. The Results of Pre-Test and Post-Test

Following the presentation of the data pre-test and post-test were obtained from the student of VB in field trial are presented in Table 4.14, the following:

Table 4. 14 Assessments of Field Trial Pre-Test and Post-Test

No.	Name of Student	Assasment	
		Pre-Test	Post-Test
1.	Adinda Rosa Hana	62	94
2.	Akmal Rizal	76	92
3.	Alfriz Nurvauziyah C.	68	88
4.	Balqis Basyasyah Naila	70	90
5.	Candra Kurniawan	68	92
6.	Faldo Yeri Sevanisa	52	96
7.	Fatahillah Tsabit Fatoni	80	100
8.	Iga Noventa Ramadhania	58	86
9.	Kameralda Naurah Aqilah	78	90
10.	Moch Patra Maulana	70	84
11.	Muhammad Naufal	78	92
12.	Muhammad Naufal Musyafa	68	90
13.	Muhammad Ridho	76	96
14.	Najah	70	92
15.	Nandita Auralia	86	96
16.	Nasywa Alf Putri	88	100
17.	Oka Luman Aryaguna	66	92
18.	Phalosafa Ghassani Zakirah	72	84

19.	Rahil Kamilia Sa'idah	70	88
20.	Ruri Kamaruzzaki	78	90
21.	Shakyla Irsya Faradisa	66	80
22.	Sulthan Rofiq Rabbani	78	84
23.	Yanuar Thaif Chalil	82	96
AMOUNT		1660	2092
Average		**72,2**	**90,9**

The table above can be seen by search of the results average of pre-test and post-test with the formula:

Mean = $\frac{\Sigma X}{N}$

Specification:

Mean : Average

ΣX : Amount of the assessment of pre or post-test

N : number of samples

Based on the average calculation with using the formula shown that the average of the pre-test is 72.2 and the average of the post-test is 90.9. The average of value of the students can be seen by the number of average post-test that is 90.9 higher than the pre-test values which tend to be smaller which is 72.2, indicating that there is a significant increase in student understanding as much as 18.8 . Students increased the value after using the science worksheets based experiential learning, so it can be said that the science worksheets based experiential learning is able to effectively improve the understanding the science lessons for subject of the light and its utilization in Class VB.

CHAPTER V

DISCUSSION

A. Analysis of The Development of Science Instructional Materials

Development of science instructional materials based on experiential learning at 5th grade in SD/MI is based on the fact that the unavailability of instructional materials based on experiential learning. The development of instructional materials refers to the 4-D model of development by Thiagarajan and Semmel that are consist of the stage of defining (define), stage of design (design), stage of development (develop) and stage of deployment (disseminate).[55] But the development of science worksheet based experiential learning is limited to the stage of development.

Basically experiential learning is not only develop of intellectual abilities but all this potential, including the development of emotional and inquiry skills is process that begins with formulating the problem, formulating a hypothesis, collect data, analyze data, and make conclusions.[56] The worksheet refers to indicators of assessing the effectiveness and attractiveness of learning.[57] Experiential learning model is can make students are able to think independently and creatively to the things that are needed during the learning process.

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[55] Thiagarajan,S Dan Semmel, D.S. (1974) *Instructional Development For TrainingTeachers Of Exceptional Children: A Sourcebook.* Minneapolis: UniversityOf Minnesota.
[56] Trianto, *Model-Model Pembelajaran Inovatif Berorientasi Konstruktivistik*, (Jakarta: Prestasi Pustaka, 2007), hlm. 137
[57] Degeng, *Ilmu Pengetahuan dan Taksonomi Variabel*. (Jakarta: Depdikbud, 1989), hlm.83

Kinds of instructional materials are procedural, factual, concept or theory and value. Science lesson is suitable to use a procedural instructional material with experiential learning approach. The instructional materials can be combining with condition around of environment. So, in this worksheet explain more practice to conducting an experience than the theory. The students can deeply a lesson with their experience, and the teacher can make a meaningfully learning.

This worksheet has advantages and disadvantages that still need improvement. The advantages of the worksheet based experiential learning, with other instructional materials are as follows:

1. The worksheet is design based on the characteristics of the students so that users can use independently.
2. The worksheet is design of a book supporting of material of science lesson on subject of light and its Utilization that suitable to the curriculum SBC in 2006, so it can be used for the next curriculum.
3. The worksheet can be suitable to the curriculum in 2013
4. The worksheet is equipped with a foundation of Al-Qur'an so that the reader can understand the purpose of science worksheet based experiential learning
5. The material is presented in accordance with SK-KD so that the worksheet can be arranged systematically. In addition, it is equipped also with the task of observation, discussion and experiment based on experiential learning, which aims to develop the student's ability to define and

formulate the question of a scientific nature and directing students in investigation activities.

6. The worksheet is equipped with a conclusion in any activity that is summarized in Incar column.
7. Completeness of the worksheet can also be viewed in the overview, students are expected to be able to remember what they have learned through a summary of the material.
8. At each activity and discussion in the worksheet presented by using images that support of materials, so that students interested in learning.
9. Evaluation of instructional materials is equipped with matters of UN

As for the shortage of science worksheet based experiential learning is only limited to the discussion of any matter that is the light and its utilization.

B. Analysis Data of Validation by Matter Expert

Based on the conversion scale is in the questionnaire of product assessment, are as follows:

1. Score 1 for not clear, inappropriate, irrelevant, not systematic, no motivation, no measure of ability.
2. Score 2 for less obvious, less fit, less relevant, less systematic, less motivated, and less measuring capability.
3. Score 3 for clear, appropriate, relevant, systematic, motivating, measuring ability.

4. Score 4 for a very clear, very fit, very relevant, very systematic, very motivated, very measuring capability.

Here are the results of data of validation by matter experts on the worksheet based on table 4.2, are as follows:

1. Suitability formulation of the topic on the development of teaching materials is very clear and very appropriate with percentages of 100%
2. The suitability of the material presented on the development of the worksheet very appropriate with percentages of 100%.
3. The suitability of competency standards with indicators is very appropriate with percentages of 100%.
4. The Suitability of indicators presented with basic competence is very appropriate with percentages of 100%.
5. The suitability of systematic description of learning content is systematic and appropriate with percentages of 75%.
6. Clarity exposure to the material very clear and very appropriate to the theme with percentages of 100%.
7. The accuracy of the material presented highly motivated students and very relevant with percentages of 100%.
8. Suitability summary of the material with discussion is clear and systematic with percentages of 75%.
9. The accuracy of evaluation instruments used can calculate ability of students with percentages of 100%

10. Ease language is used in teaching materials darting through clear and very systematic with percentages of 100%

Data from the questionnaire by Mr. Agus Mukti Wibowo, M.Pd as materials experts, can be calculated using the percentage of validity level of the worksheet as follows:

$$P = \frac{\sum X}{\sum X1} \times 100\ \%$$

$$P = \frac{\sum 38}{\sum 40} \times 100\ \% = 95\ \%$$

Based on the results above, obtained the percentage by 95% in the qualification of valid so that the worksheets do not need to be revise. The statement indicates that science worksheet based experiential learning to subject of light and its utilization is fit for use in accordance with validation by material expert.

C. Analysis Data of Validation by Media Expert

Based on the conversion scale set out in the questionnaire product assessment questionnaire are as follows:

1. Score 1 for very not good.
2. Score 2 for no good.
3. Score 3 for good.
4. Score 4 for very good.

Here are the results of data of the validation by matter experts based on table 4.6 are as follows:

1. Cover is very accordance with the contents of the material with percentages of 100%.

2. Typeface that used is very accordance with students with percentages of 100%.
3. Font size used is accordance with the student with percentages of 75%.
4. Pictures in the book are very accordance with the materials with percentages of 100%.
5. The images used is attract to students with percentages of 75%.
6. The layout of the image on the book is interesting with percentages of 75%.
7. Pictures in the book are very close to the student life with percentages of 100%.
8. The size of the images in the book is very precise with percentages of 100%.
9. Color book is consistent with percentages of 75%.
10. Layout on the book is very interesting with percentages of 75%.

The data from the questionnaire responses were completed by Mr. Nurul Yaqin M.Pd as a media expert can be calculated using the percentage of validity level of the worksheet as follows:

$$P = \frac{\sum X}{\sum X1} \times 100\ \%$$

$$P = \frac{\sum 36}{\sum 40} \times 100\ \% = 90\ \%$$

Based on the results above, the percentage obtained by 90% stated the qualification of valid so that the worksheet does not need to be revised. The statement indicates that science worksheet based experiential learning to

subject of light and its utilization is fit for use in accordance with validation of media expert.

D. Analysis Data of Validation by Learning Expert

Based on the conversion scale set out in the questionnaire product assessment questionnaire, are as follows:

1. Score 1 for not clear, inappropriate, irrelevant, not systematic.
2. Score 2 for less obvious, less fit, less relevant, less systematic.
3. Score 3 for quite obvious, quite appropriate, relevant enough, quite systematically.
4. Score 4 for a very clear, very fit, very relevant, very systematic.

Here are the exposure of results data of the validation by learning expert based on table 4.10, are as follows:

1. Suitability formulation of the topic on the development of the worksheet is very clear, and very systematic with percentages of 100%.
2. The suitability of the material presented on the development of worksheet is quite clear with percentages of 75%
3. Suitability of competency standards with indicators is very appropriate with percentages of 100%.
4. Suitability of indicators presented with basic competencies quite suitable and quite relevant with percentages of 100%.
5. Suitability of systematic description of the learning content is quite appropriate with percentages of 75%.

6. Clarity exposure to the material sufficiently is clear and systematic with percentages of 75%.
7. The accuracy of the material presented can provide motivation to the students is very appropriate and very clear with percentages of 100%.
8. Suitability of summary of the material and discussion is very clear with percentages of 100%.
9. The accuracy of evaluation instruments used can measure of ability students is very appropriate with percentages of 100%.
10. Ease language used in teaching materials is very systematic with percentages of 100%.

Data from the questionnaire responses were completed by Mrs. Wiwit Wijayati, S.Pd as a learning expert, can be calculated using the percentage of validity level, as follows:

$$P = \frac{\sum X}{\sum X1} \times 100\ \%$$

$$P = \frac{\sum 37}{\sum 40} \times 100\ \% = 92,5\ \%$$

Based on the results above, obtained a percentage of 92.5%, stated is in the valid qualification, so that the worksheet do not need to be revised. The statement indicates that science worksheet based experiential to subject of light and its utilization is fit for use in accordance with validation by learning expert.

E. Analysis Data of Product Trial

Based on the data that shown in the table, 4.13, the questionnaire filled out by the target subjects there are all of students in the class VB in MI

Khadijah Malang, amounting to 23 students, as for the assessment field trials on each component as to which data that have been analyzed quantitatively in table 4.13, following the data field trials:

1. The sciences worksheet can help students learn, from the statement obtained by the percentage of votes 100%.
2. The sciences worksheet can encourage students to learn, from the statement obtained by the percentage of votes 100%.
3. The sciences worksheet easier for students to understand the Natural Sciences of the statement obtained by the percentage of votes 98.9%.
4. Task on the sciences worksheet relatively easily from the statement obtained by the percentage of votes 86.9%.
5. Typeface and size of letters contained in The sciences worksheet is easy to read, from the statement obtained by the percentage of votes 100%.
6. The language used in The sciences worksheet can be understood from the statement obtained by the percentage of votes 97.8%
7. During the course of this book, the student does not meet the difficult words, of the statement with the percentage of votes obtained 98.9%.
8. During use the sciences worksheet, students do not need the help of others like friends, teachers, or parents to learn, from the statement obtained by the percentage of votes 82%.
9. Natural Sciences teaching materials is interesting to learn, from the statement obtained by the percentage of votes 92%.

10. Natural Sciences teaching materials can increase the motivation to learn, from the statement obtained by the percentage of votes 98.9%.

Questionnaire responses were filled by students at class VB in MI Khadijah Malang, amounting to 23 students, as a whole can be calculated using the percentage of validity level as follows:

$$P = \frac{\sum X}{\sum X1} \times 100\ \%$$

$$P = \frac{\sum 886}{\sum 920} \times 100\ \% = 96{,}3\ \%$$

Based on the results of the calculation of the above data, obtained a percentage of 96.3%, stated is the valid qualification so that the sciences worksheet do not need to be revised. The statement indicates that the sciences worksheet is fit for use in the learning process.

F. Analysis Data of Results Pre-Test and Post-Test

Based on the data in the table 4.14, the pre-test and post-test to the students of class VB MI Khadijah Malang as a whole can be calculated using the percentage of validity level of teaching materials as follows:

1. **Pre-Test:**

$$\text{Mean} = \frac{\sum X}{N}$$

$$\text{Mean} = \frac{\sum 1660}{23} = 72{,}2$$

2. **Post-Test:**

$$\text{Mean} = \frac{\sum X}{N}$$

$$\text{Mean} = \frac{\sum 2092}{23} = 90{,}9$$

Based on the results of the calculation of data above shows that the average pre-test score is 72 and the average post-test value is 90.9 which can be seen by the amount of the average of post-test is showed that there are significant insight as many as 18.8. In conclusion there are the significant of differences between the results of understanding, before and after the use of science worksheet based experiential learning to subject of light and its utilization. It can be said that the science worksheet based experiential learning to subject of light and its utilization is effectively to improve student's understanding of the science lesson in VB class.

G. Revision of The Product

1. Revision of Product by Material Expert

Based on the feedback and suggestions from the validator of matter experts in table 4.4, it can be seen in the following explanation:

a. Examining the posts in teaching materials because there are some wrong.
b. Clarify the picture on the worksheet.
c. Multiply examples of the application the light in everyday life
d. Researching the evaluation questions, so that there are no unambiguous answer choices.
e. Can be used for research.

2. Revision of Product by Media Expert

Based on the feedback and received from the validator media experts in table 4.8, it can be seen in the following explanation:

a. Eliminating the box if it is not required on the worksheet
b. Fixing the image to suitable with book
c. Fixing variation/composition of colors is reduced, so that not too many colors
d. Changing the font size to be the same
e. Changing the font type that uniform

H. Analysis of Effectiveness and Attractiveness of The Product

In essence learning is teaching students with using educational principles and theories of learning which is a determinant for the success of education.[58] The steps taken by the teachers to teaching science in seeing the level of effectiveness, and attractiveness of learning activity that is by dividing into three kinds, there are the initial activity, core activities, and closing activities. Three stages that do by teachers implement the learning process, so it can be done systematically. Here's an explanation related to the activities carried out.

The initial activity, the teacher lists of tasks to focus students of material taught, give motivation and explore initial knowledge of students with questions and answers as well as by giving examples related to materials, such as providing information relating to the material being taught.

Core activities, is an activity to explain the material fully. Core activities must go through several stages so that the learning objectives can be delivered entirely. Phases divided into three there are exploration, elaboration,

[58] Syaiful Sagala, *op.cit.*, hlm. 61

and confirmation. These stages are arranged so that students can achieve study objectives and indicators.

Cover activities, shows the cover of learning where the teacher gives a stimulus associated with the material that has been submitted jointly concluded that the learning and given the material that has been taught and reflect on their lessons.

1. The Level of Effectiveness Products

The data from learning activities obtained from the results of Pre-Test and Post-Test to determine the level of effectiveness of product. Based on the results of the calculation of the data showed that the average of pre-test score is 72 and the average of post-test score is 90.9, showed that there are significant understanding as much as 18,8. The conclusion is significant differences between the results of understanding before and after the use of science worksheet based experiential learning to subject of light and its utilization. It can be said that the worksheet based experiential learning to subject of light and its utilization is effectively to improve student's understanding of the science lesson in VB class. This is supported Musfiqon, state the instructional media or instructional materials to help students improve comprehension, presenting interesting and reliable data, facilitate interpretation of the material and condense information.[59]

[59] Musfiqon, *Pengembangan Media dan Sumber Pembelajaran*. (Jakarta:Prestasi Pusaka,2012), hlm.40

Ease of understanding of the material by applying science worksheet based experiential learning in line with the results of research conducted by Hanafita, which states that the student's response to the application of learning with worksheet based experience on learning greatly assist students in obtaining optimal results, so that learning is more effective.[60]

2. The Level of Attractiveness Product

Student's responses to aspects of the attractiveness in table 4. 13 on statement of number 10 by 100% stated are included in the category of very attractive. According to James W. Bowman, illustration is a device that can attract student interest. Science worksheet based experiential learning also gives attractiveness to students.[61] It is powered by Sudjana and Rivai are stating that the presence of teaching materials, teaching methods will be more varied, not merely using verbal communication by narrative of words by a teacher.[62]

[60] Hanafita Hajar, "Pengembangan LKS berbasis metode percobaan untuk mengoptimalkan pemahaman konsep sains kelas V SDN Trowono II", *Jurnal*, Universitas Negeri Semarang, 2012
[61] Sudjana, *Media Pengajara.* (Bandung:Sinar Baru Algesindo,2013), hlm.32
[62] Ibid,.hlm.34

CHAPTER VI

CLOSING

A. Conclusions

Based on the development process and the results of field trials for Science Worksheet Based Experiential Learning at Class VB in MI Khadijah Malang can be described as follows:

1. The development of these instructional materials to products such as books a science worksheet for subject of the light and its utilization at fifth grade based experiential learning which refers to the 4-D model of development according to Thiagarajan and Sammel, consisting of definition phase, design phase, development phase and disseminate phase, but in practice are performed at the development phase.
2. The result of product trials of the worksheet based experiential learning has a high level of validity, effectiveness and attractiveness.
    a. Based on the results of the responses of criticism and advice from validator expert and assessment of teachers and students in grade VB MI Khadijah Malang as user the worksheet, following the results of the validity:
        1) Response of assessment by matter experts to obtain validity percentage reaches 95%.
        2) Response of assessment by media experts to obtain validity percentage reaches 90%.

3) Response of assessment by learning experts to obtain validity percentage reached 92.5%.

4) Response of assessment of the field trials to obtain validity percentage reached 96,3%.

b. Based on the results of score pre-test and post-test, showed that the average score of pre-test is 72 and the average score of post-test is 90.9. There are significant differences between the results of understanding before and after the use of the worksheet as much as 18.8. Therefore the science worksheet based experiential learning is able to effectively improve student's understanding of the science lesson in class VB.

c. Based on the results of the field trial, the assessment of VB graders as a user the worksheet, showed the attractiveness levels as much as 100%.

B. Suggestions

The suggestions include of suggestions for the product utilization purpose and suggestions of advanced development, following a detailed explanation associated with suggestions:

1. Suggestions for Purposes of Product Utilization

   Here are some suggestions related to the purposes of utilization product:

   a. The worksheet is organized according to the characteristics of students, so it is expected that students can use independently.

b. Science worksheet based experiential learning for material of light and its utilization is not the only source of student learning, teachers should advise students to read other relevant sources.

c. Science worksheet based experiential learning can be tailored to the curriculum 2013 in class IV, theme 5 is "Hero", in KI-3 understand of factual knowledge by observing and ask based on curiosity about him, God's creatures and energy through observation, as well as the met at home and at school, at KD 3.6 is to understand the properties of light through observation and describe its application in daily life and at KD 4.5 that makes a work/models that utilize the properties of light.

2. Suggestions for Dissemination Products

The development of science worksheet based experiential learning is not do the dissemination phase. However, if desired for dissemination process, some of which need to be considered are:

a. The worksheet is based on student characteristics in MI Khadijah Malang. If you want to be reproduced, should be revised in accordance with the characteristics of other users.

3. Suggestions for Further Development

Based on the note of trials that have been conducted, it is for advanced developers and to optimize resource utilization, provides suggestions as follows:

a. Product development has been carried small revisions in accordance with the advice of validator and student users. However, to improve the quality of teaching materials should be revised further.

b. This product is confined to the material properties of light and its use therefore, need to develop other materials in science subjects.

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IDENTITY OF VALIDATOR

1. **Validator of Matter Expert**

   Name : Agus Mukti Wibowo, M.Pd

   Office : Lecture of FITK UIN Maulana Malik Ibrahim Malang

   Address : MSI E-29

   Educational Background

   S-2 Pendidikan Kimia, Universitas Negeri Malang

2. **Validator of Design Expert**

   Name : Nurul Yaqin, M.Pd

   Office : Lecture of FITK UIN Maulana Malik Ibrahim Malang

   Address : Jl. Raya Candi 3 / 454 Malang

   Educational Background

   S-2

3. **Validator of Learning Expert**

   Name : Wiwit Sri Widayati, S.Pd

   Office : Teacher of MI Khadijah Malang

   Address : Jl. Arjuno 19 A

   Educational Background

   S-1 Pendidikan Biologi

FORMAT PENILAIAN AHLI ISI MATERI

Fakultas : **Ilmu Tarbiyah dan Keguruan**
Jurusan : **Pendidikan Guru Madrasah Ibtidaiyah**
Judul Bahan Ajar : **LKS Sifat-Sifat Cahaya dan Perubahannya**
Penyusun : **Juliana Ulfa**

A. Pengantar

Berkaitan dengan pelaksanaan pengembangan bahan ajar IPA kelas V tentang Sifat-sifat Cahaya dan Pemanfaatannya menggunakan pendekatan Experiental Learning, peneliti bermaksud untuk mengadakan validasi bahan ajar yang telah dicetak sebagai bahan pembelajaran. Untuk itu, dimohon Bapak/Ibu mengisi angket dengan format dibawah, dengan tujuan untuk mengetahui kesesuian pemanfaatan buku serta sebagai pengukuruan bahan ajar sehingga layak digunakan. Atas kesediaannya diucapkan terimakasih.

Nama :.....
Instansi :.....
Pendidikan :.....
Alamat : .....

B. Petunjuk Pengisian Angket:

1. Bacalah setiap item dengan cermat.
2. Instrumen ini terdiri dari kolom pernyataan dan kolom jawaban. Silahkan tandai salah satu jawaban yang sesuai dengan pernyataan anda.
3. Keterangan makna pada huruf pilihan anda adalah sebagai berikut:

Jawaban	**Keterangan**	**Skor**
SB	Sangat baik	4
B	Baik	3
TB	Tidak Baik	2
STB	Sangat Tidak Baik	1

No.	Pernyataan	Keterangan			
		SB	B	TB	STB
1.	Kesesuaian rumusan topik pada pengembangan bahan ajar.				
2.	kesesuaian materi yang disajikan pada pengembangan bahan ajar.				
3.	Kesesuaian Standar Kompetensi dengan Indikator.				
4.	Kesesuaian Indikator yang disajikan dengan Kompetensi Dasar.				
5.	Kesesuaian sistematika uraian isi pembelajaran				
6.	Kejelasan paparan materi.				
7.	Ketepatan materi yang disajikan dapat memberikan motivasi kepada siswa.				
8.	Kesesuaian rangkuman materi dengan pembahasan.				
9.	Ketepatan instrumen evaluasi yang digunakan dapat mengkur kemampuan siswa.				
10.	Kemudahan bahasa yang digunakan dalam bahan ajar.				
Jumlah					

Berdasarkan penilaian di atas, maka saya menyatakan bahwa bahan ajar ini:

a. Dapat digunakan tanpa revisi

b. Dapat digunakan dengan revisi kecil

c. Dapat digunakan dengan revisi besar

d. Belum dapat digunakan

Saran:

_____

_____

_____

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……, …… 2015

Validator,

NIP.

FORMAT PENILAIAN AHLI DESAIN

Fakultas : **Ilmu Tarbiyah dan Keguruan**
Jurusan : **Pendidikan Guru Madrasah Ibtidaiyah**
Judul Bahan Ajar : **LKS Sifat-Sifat Cahaya dan Pemanfaatannya**
Penyusun : **Juliana Ulfa**

A. Pengantar

Berkaitan dengan pelaksanaan pengembangan bahan ajar IPA kelas V tentang Sifat-sifat Cahaya dan Pemanfaatannya menggunakan pendekatan Experiental Learning, peneliti bermaksud untuk mengadakan validasi bahan ajar yang telah dicetak sebagai bahan pembelajaran. Untuk itu, dimohon Bapak/Ibu mengisi angket dengan format dibawah, dengan tujuan untuk mengetahui kesesuian pemanfaatan buku serta sebagai pengukuruan bahan ajar sehingga layak digunakan. Atas kesediaannya diucapkan terimakasih.

Nama :.....
Instansi :.....
Pendidikan :.....
Alamat : .....

B. Petunjuk Pengisian Angket:

1. Bacalah setiap item dengan cermat.
2. Instrumen ini terdiri dari kolom pernyataan dan kolom jawaban. Silahkan tandai salah satu jawaban yang sesuai dengan pernyataan anda.
3. Keterangan makna pada huruf pilihan anda adalah sebagai berikut:

Jawaban	Keterangan	Skor
SB	Sangat baik	4
B	Baik	3
TB	Tidak Baik	2
STB	Sangat Tidak Baik	1

No.	Pernyataan	Keterangan			
		SB	B	TB	STB
1.	Desain *cover* sesuai dengan isi materi.				
2.	Jenis huruf yang digunakan sesuai dengan siswa MI kelasV.				
3.	Ukuran huruf yang digunakan sesuai dengan siswa MI kelas V.				
4.	Gambar pada buku sesuai dengan materi.				
5.	Gambar yang digunakan menarik minat siswa.				
6.	Tata letak gambar pada buku menarik.				
7.	Gambar pada buku dekat dengan kehidupan siswa.				
8.	Ukuran gambar pada buku tepat.				
9.	Warna pada buku konsisten.				
10.	*Layout* pada buku menarik.				
	Jumlah				

Berdasarkan penilaian di atas, maka saya menyatakan bahwa bahan ajar ini:

a. Dapat digunakan tanpa revisi

b. Dapat digunakan dengan revisi kecil

c. Dapat digunakan dengan revisi besar

d. Belum dapat digunakan

Saran:

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……, …… 2015

Validator,

NIP.

FORMAT PENILAIAN AHLI PEMBELAJARAN UNTUK GURU BIDANG STUDI IPA KELAS V SD/MI

Fakultas : **Ilmu Tarbiyah dan Keguruan**
Jurusan : **Pendidikan Guru Madrasah Ibtidaiyah**
Judul Bahan Ajar : **LKS Sifat-Sifat Cahaya dan Perubahannya**
Penyusun : **Juliana Ulfa**

A. Pengantar

Berkaitan dengan pelaksanaan pengembangan bahan ajar IPA kelas V tentang Sifat-sifat Cahaya dan Pemanfaatannya menggunakan pendekatan Experiental Learning, peneliti bermaksud untuk mengadakan validasi bahan ajar yang telah dicetak sebagai bahan pembelajaran. Untuk itu, dimohon Bapak/Ibu mengisi angket dengan format dibawah, dengan tujuan untuk mengetahui kesesuian pemanfaatan buku serta sebagai pengukuruan bahan ajar sehingga layak digunakan. Atas kesediaannya diucapkan terimakasih.

Nama :.....
Instansi :.....
Pendidikan :.....
Alamat : .....

B. Petunjuk Pengisian Angket:

1. Bacalah setiap item dengan cermat.
2. Instrumen ini terdiri dari kolom pernyataan dan kolom jawaban. Silahkan tandai salah satu jawaban yang sesuai dengan pernyataan anda.
3. Keterangan makna pada huruf pilihan anda adalah sebagai berikut:

Jawaban	Keterangan	Skor
SB	Sangat baik	4
B	Baik	3
TB	Tidak Baik	2
STB	Sangat Tidak Baik	1

No.	Pernyataan	Keterangan			
		SB	B	TB	STB
1.	Kesesuaian rumusan topik pada pengembangan bahan ajar.				
2.	kesesuaian materi yang disajikan pada pengembangan bahan ajar.				
3.	Kesesuaian Standar Kompetensi dengan Indikator.				
4.	Kesesuaian Indikator yang disajikan dengan Kompetensi Dasar.				
5.	Kesesuaian sistematika uraian isi pembelajaran				
6.	Kejelasan paparan materi.				
7.	Ketepatan materi yang disajikan dapat memberikan motivasi kepada siswa.				
8.	Kesesuaian rangkuman materi dengan pembahasan.				
9.	Ketepatan instrumen evaluasi yang digunakan dapat mengkur kemampuan siswa.				
10.	Kemudahan bahasa yang digunakan dalam bahan ajar.				
Jumlah					

Berdasarkan penilaian di atas, maka saya menyatakan bahwa bahan ajar ini:

a. Dapat digunakan tanpa revisi

b. Dapat digunakan dengan revisi kecil

c. Dapat digunakan dengan revisi besar

d. Belum dapat digunakan

Saran:

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……, …… 2015

Validator,

NIP.

INSTRUMEN VALIDASI PENGEMBANGAN BAHAN AJAR UNTUK SISWA KELAS V SD/MI

Fakultas	**: Ilmu Tarbiyah dan Keguruan**
Jurusan	**: Pendidikan Guru Madrasah Ibtidaiyah**
Judul Bahan Ajar	**: LKS Sifat-Sifat Cahaya dan Pemanfaatannya**
Penyusun	**: Juliana Ulfa**

A. Pengantar

Adik, Berkaitan dengan pelaksanaan pengembangan bahan ajar IPA kelas V tentang Sifat-sifat Cahaya dan Pemanfaatannya menggunakan pendekatan Experiental Learning, peneliti bermaksud untuk mengadakan validasi bahan ajar yang telah dicetak sebagai bahan pembelajaran. Untuk itu, dimohon adik mengisi angket dengan format dibawah, dengan tujuan untuk mengetahui kesesuian pemanfaatan buku serta sebagai pengukuruan bahan ajar sehingga layak digunakan. Hasil pengukuran melalui angket akan digunakan untuk menyempurnakan bahan ajar, agar dapat dimanfaatkan dalam kegiatan belajar mengajar. Sebelumnya saya sampaikan terima kasih atas kesediaan adik sebagai pemakai media belajar.

Nama : ……...

Kelas : ……...

Sekolah : ……...

B. Petunjuk Pengisian Angket

1. Sebelum mengisi angket ini, mohon terlebih dahulu adik membaca atau mempelajari bahan ajar yang dikembangkan.
2. Pilihlah salah satu angka pada jawaban yang sesuai dengan penilaian yang adik anggap paling tepat.

Skala Penilaian/ Tanggapan			
1	**2**	**3**	**4**

Keterangan:

a. Skor 1 untuk tidak jelas, tidak sesuai, tidak relevan, tidak sistematis.
b. Skor 2 untuk kurang jelas, kurang sesuai, kurang relevan, kurang sistematis.
c. Skor 3 untuk jelas, sesuai, relevan, sistematis.
d. Skor 4 untuk sangat jelas, sangat sesuai, sangat relevan.

C. Pertanyaan-pertanyaan Angket

1. Apakah bahan ajar LKS IPA berbasis Experiental Learning dapat memudahkan adik dalam belajar?

1	2	3	4
Tidak memudahkan	Kurang memudahkan	Memudahkan	Sangat memudahkan

2. Apakah dengan menggunakan bahan ajar LKS IPA berbasis Experiental Learning dapat memberi semangat dalam belajar adik?

1	2	3	4
Tidak memberi semangat	Kurang memberi semangat	Memberi semangat	Sangat memberi semangat

3. Apakah adik mudah memahami materi yang ada di dalam bahan ajar LKS IPA berbasis Experiental Learning yang telah dikembangkan ini?

1	2	3	4
Tidak Mudah	Kurang mudah	Mudah	Sangat mudah

4. Menurut adik, bagaimana soal-soal pada bahan ajar LKS IPA berbasis Experiental Learning ini?

1	2	3	4
Tidak Mudah	Kurang mudah	Mudah	Sangat mudah

5. Bagaimana jenis huruf dan ukuran huruf yang terdapat dalam bahan ajar LKS IPA berbasis Experiental Learning?

1	2	3	4
Tidak Mudah	Kurang mudah	Mudah	Sangat mudah

6. Apakah bahasa yang digunakan dalam bahan ajar mudah dipahami?

1	2	3	4
Tidak Mudah dipahami	Kurang mudah dipahami	Mudah dipahami	Sangat mudah dipahami

7. Selama mempelajari bahan ajar ini, apakah adik menemui kata-kata yang sulit?

1	2	3	4
Sangat menemukan	Menemukan	Kurang menemukan	Tidak menemukan

8. Selama menggunakan bahan ajar, apakah kalian memerlukan bantuan orang lain seperti teman, guru, atau orang tua?

1	2	3	4
Sangat membutuhkan	Membutuhkan	Kurang membutuhkan	Tidak membutuhkan

9. Menurut adik, bahan ajar LKS IPA berbasis Experiental Learning yang telah dikembangkan ini menarik untuk dipelajari?

1	2	3	4
Tidak Menarik	Kurang menarik	Menarik	Sangat menarik

10. Apakah bahan ajar LKS IPA berbasis Experiental Learning ini dapat menambah motivasi adik dalam belajar?

1	2	4	5
Tidak Memotivasi	Kurang memotivasi	Memotivasi	Sangat memotivasi

Terimakasih

TRANSKIP WAWANCARA

Narasumber : Wiwit Sri Widayati, S.Pd

Pewawancara : Juliana Ulfa

Tempat : Ruang tamu MI Khadijah Malang

Hari/Tanggal : Selasa, 9 September 2014

HASIL WAWANCARA

Julia : Bu wiwit, dalam mengajar IPA di kelas 5, bahan ajar apa saja yang anda gunakan sebagai penunjang proses belajar mengajar?

Bu Wiwit : Bahan ajar yang saya gunakan ya menurut kisi-kisi dari sekolah, semua buku dan LKS yang digunakan dalam proses pembelajaran, semua itu langsung diberi oleh sekolah.

Julia : Menurut ibu, apakah bahan ajar yang digunakan sudah sesuai dengan karakter siswa dan membuat proses pembelajaran menjadi lebih efektif?

Bu Wiwit : Saya sebenarnya jarang menggunakan buku paket dan LKS untuk mengajar, karena konsep-konsepnya itu banyak yang salah. Sampeyan sudah bisa liat sendiri ke kelas, disana banyak buku-buku paket yang menumpuk itu jarang saya gunakan.

Julia : Bagaimana dengan LKS yang digunakan oleh siswa, Bu?

Bu Wiwit : LKS hanya saya gunakan untuk memberi soal-soal kepada anak-anak setelah saya terangkan materinya.

Julia : Apakah LKS yang di gunakan sebagai bahan ajar, bisa menjadi penunjang buku ajar dalam proses pembelajaran?

Bu Wiwit : Gimana ya mbak, anda sudah lihat sendiri bagaimana isi dari LKS dan buku teks yang digunakan di sekolah ini. Kalau menurut saya pribadi, semua LKS khususnya LKS IPA itu isinya hanya soal-soal yang instan. Sekali dibaca langsung ketemu jawabannya. Makanya jarang saya gunakan, hanya beberapa kali saja. Pembahasan yang ada di buku dan di LKSnya juga ada beberapa yang tidak sama.

Julia : Menurut ibu, apa saja kekurangan dari bahan ajar yang digunakan, khususnya LKS?

Bu Wiwit : Tadi sudah saya sebutkan, kalau bukunya jarang saya gunakan karena konsepnya banyak yang salah. Kalau LKS nya, isinya itu tidak menjabarkan konsep dari materi. Saya kan ngajar IPA, bukan hanya materi saja, tapi praktek-praktek itu yang lebih banyak. Nah, di buku dan di LKS itu malah materi saja.

Julia : Materi apa yang dirasa sulit oleh murid-murid kelas 5, khususnya kelas VB dalam belajar IPA, Bu?

Bu Wiwit : Biasanya saya memerlukan lebih banyak JP dalam menerangkan materi pesawat sederhana, gaya, dan sifat cahaya. Karena di materi ini pembahasannya banyak.

Malang, ……..

Narasumber

Guru Bidang Studi IPA Kelas V

Wiwit Sri Widayati, S.Pd

SOAL PRE-TEST SISWA KELAS VB MI KHADIJAH MALANG

I. *Berilah tandan silang (X) pada huruf a, b, c, atau d, untuk jawaban yang paling tepat!*

1. Benda yang dapat memancarkan cahaya disebut ....
   a. benda bening
   b. cermin
   c. sumber cahaya
   d. spektrum cahaya
2. Berikut termasuk sumber cahaya, ***kecuali*** ....
   a. Matahari
   b. Lampu
   c. batu
   d. lilin
3. Benda yang dapat ditembus cahaya disebut ....
   a. benda bering
   b. benda keruh
   c. benda gelap
   d. benda coklat
4. Berikut adalah sifat-sifat cahaya, ***kecuali*** ....
   a. dapat dipantulkan
   b. merambat lurus
   c. dapat dibiaskan
   d. merambat berbalik
5. Arah rambatan cahaya adalah ....
   a. Lurus
   b. Melengkung
   c. menyebar
   d. tidak beraturan
6. Benda yang dapat meneruskan sebagian besar cahaya yang mengenainya disebut benda ....
   a. Gelap
   b. Keras
   c. bening
   d. keruh
7. Bayangan yang dihasilkan menunjukkan mirip dengan benda aslinya. Hal ini membuktikan bahwa cahaya ....
   a. merambat lurus
   b. dibiaskan
   c. dipantulkan
   d. dibelokkan
8. Pada hukum pemantulan cahaya, sudut datang sama dengan ....
   a. sudut pantul
   b. sudut titik
   c. sudut pergi
   d. sudut searah
9. Berkas cahaya dari pemantulan yang dihasilkan teratur dan sejajar disebut pemantulan ....
   a. Difus
   b. Teratur
   c. baur
   d. biasa
10. Pemantulan baur terjadi karena sinar mengenai permukaan benda ....
    a. Halus
    b. Gelap
    c. kasar
    d. bening
11. Dasar kolam renang dapat terlihat karena sifat cahaya ....
    a. merambat lurus
    c. menembus benda bening

b. dibiaskan d. dipantulkan

12. Jika cahaya mengenai kaca maka cahaya akan ....
    a. dipantulkan teratur c. dibiaskan menyebar
    b. dipantulkan ke segala arah d. dibiaskan mengumpul
13. Kolam renang yang dalam terlihat dangkal. Hal ini karena sifat cahaya ....
    a. Dibiaskan c. dipantulkan
    b. merambat lurus d. menembus benang bening
14. Alat yang biasa digunakan pada kapal selam untuk melihat permukaan laut adalah ....
    a. Teropong c. proyektor
    b. Periskop d. kamera
15. Benda berikut yang menerapkan sifat cahaya dapat dibiaskan adalah ....
    a. Cermin b. lensa
    b. prisma kaca d. kaca jendela

II. *Isilah titik-titik di bawah ini dengan jawaban yang tepat!*

1. Benda yang tidak dapat ditembus cahaya disebut ....
2. Sprektum cahaya pelangi terdiri dari ….
3. Cermin datar adalah cermin yang permukaannya berupa ....
4. Sifat cermin cembung adalah ....
5. Alat yang digunakan untuk mengamati benda-benda yang sangat jauh disebut ....

III. *Jawablah pertanyaan di bawah ini dengan benar!*

1. Sebutkan 6 sifat cahaya!
2. Apa yang terjadi ketika cahaya jatuh mengenai benda?
3. Sebutkan hukum pembiasan cahaya!
4. Sebutkan dan jelaskan macam-macam cermin!
5. Sebutkan alat-alat yang memanfaatkan sifat-sifat cahaya!

SOAL POST TEST SISWA KELAS VB MI KHADIJAH MALANG

A. Berilah tanda silang (X) pada huruf a, b, c, atau d dengan jawaban yang benar!

1. Peristiwa yang merupakan bukti cahaya merambat lurus yaitu . . . .
   a. memantulnya cahaya pada cermin
   b. rambatan cahaya matahari
   c. cahaya pada lampu mobil
   d. cahaya yang lurus menembus benda bening
2. Kita dapat melihat benda di balik kaca jendela, karena . . . .
   a. kaca jendela tipis
   b. kaca jendela mengilap
   c. cahaya dapat melewati kaca
   d. kaca memancarkan cahaya
3. Di bawah ini yang termasuk benda tembus cahaya yaitu . . . .
   a. Kertas
   b. air jernih
   c. tripleks
   d. kayu
4. Di antara jenis benda berikut yang biasa digunakan untuk bercermin yaitu . . . .
   a. cermin datar
   b. cermin cembung
   c. cermin cekung
   d. lensa cembung
5. Bayangan yang dibentuk oleh cermin datar mempunyai sifat . . . .
   a. jarak benda ke cermin sama dengan jarak bayangan ke cermin
   b. bayangan bersifat nyata
   c. bayangan terbalik
   d. bayangan lebih kecil daripada benda aslinya
6. Sifat bayangan yang dibentuk oleh cermin cembung yaitu . . . .
   a. maya, tegak, dan diperkecil
   b. nyata, tegak, dan diperkecil
   c. maya, terbalik, dan diperbesar
   d. nyata, terbalik, dan sama besar
7. Peristiwa yang merupakan akibat pembiasan cahaya yaitu . . . .
   a. terbentuknya warna pada gelembung sabun
   b. dasar sungai yang airnya jernih tampak lebih dangkal daripada yang sebenarnya
   c. terbentuknya bayangan oleh cermin
   d. sampainya cahaya matahari di permukaan bumi
8. Apabila cahaya merambat dari udara ke air, cahaya tersebut akan dibiaskan dengan arah . . . .

a. menjauhi garis normal
b. mendekati garis normal
c. sejajar garis normal
d. berlawanan arah dengan garis normal

9. Peristiwa yang menunjukkan adanya dispersi cahaya yaitu . . . .
   a. elang dapat melihat ikan di dalam air
   b. bayangan pada cermin
   c. pensil dalam air terlihat patah
   d. pelangi
10. Di antara benda berikut yang digunakan untuk membuat periskop yaitu . . . .
   a. cermin datar
   b. cermin cembung
   c. cermin cekung
   d. lensa cembung
11. Alat ini biasa digunakan oleh tukang reparasi jam untuk melihat bagian mesin jam yang rusak. Alat yang dimaksud yaitu . . . .
   a. mikroskop
   b. periskop
   c. teropong
   d. lup
12. Salah satu sifat cahaya yang dimanfaatkan dalam pembuatan kaleidoskop yaitu . . . .
   a. cahaya merambat lurus
   b. cahaya dapat dipantulkan
   c. cahaya dapat dibiaskan
   d. cahaya dapat didispersikan
13. Pada kaleidoskop yang berfungsi menjadi cermin yaitu . . . .
   a. plastik bening
   b. kertas yang mengilap
   c. potongan plastic
   d. kertas tulis
14. Pada periskop semakin jauh jarak kedua cermin, maka . . . .
   a. bayangan semakin jelas
   b. tidak terbentuk bayangan
   c. bayangan semakin kabur
   d. tidak dapat digunakan
15. Lup sederhana pada dasarnya yaitu . . . .
   a. Lensa cekung
   b. cermin cembung
   c. cermin cekung
   d. lensa cembung

B. **Isilah titik-titik di bawah ini dengan jawaban yang ada pada kotak!**

a. Menyerap cahaya	g. lampu sorot panggung
b. kaca spion	h. halus
c. benda gelap	i. pembiasan cahaya
d. mikroskop	j. teleskop
e. sama besar	k. Proyektor

1. Benda hitam bersifat ...
2. Cahaya akan memantul dengan baik pada permukaan ... .
3. Benda yang tidak dapat ditembus cahaya disebut ...
4. Cermin cembung digunakan pada ...
5. Cermin cekung digunakan pada ...
6. Alat untuk melihat benda-benda sangat kecil (tidak kasat mata) adalah ...
7. Dasar sungai yang jernih terlihat lebih dangkal disebabkan ...
8. Alat untuk memproyeksikan gambar atau tulisan pada layar adalah ...
9. Teropong bintang disebut juga ...
10. Sifat bayangan pada cermin datar adalah ... .

C. **Jawablah soal-soal di bawah ini dengan jawaban yang benar!**

1. Pernahkah kamu melihat huruf pada mobil ambulans? Huruf-huruf yang tertulis pada mobil ambulans ditulis terbalik dari depan hingga akhirnya. Dapatkah kamu jelaskan terbaliknya penulisan huruf pada mobil ambulans tersebut? Kaitkanlah dengan sifat cermin terutama cermin cembung!
2. Pada siang hari, Adi berdiri di dekat kolam ikan. Ia melihat dasar kolam terlihat dangkal. Padahal, sesungguhnya kolam itu cukup dalam. Hal apa yang menyebabkan ini terjadi? Kaitkanlah dengan sifat pembiasan cahaya!
3. Apa kamu memiliki kaca spion dan cermin datar? Coba bercerminlah di depan kaca spion dan cermin datar pada jarak yang sama! Bandingkanlah kedua bayanganmu! Manakah yang lebih kecil? Mengapa demikian?
4. Badrun dan Seno jalan-jalan di taman kota. Badrun menggunakan pakaian berwarna putih. Sedangkan Seno memakai pakaian berwarna hitam. Tidak lama kemudian Seno merasa panas. Adapun Badrun tidak merasakan panas seperti Seno. Mengapa demikian?
5. Cahaya matahari yang kita lihat sebagai cahaya putih, sebenarnya terdiri dari bermacam-macam warna. Warna apa saja yang membentuk cahaya putih matahari itu?

TRANSKIP NILAI KELAS VB MI KHADIJAH MALANG

Bidang Studi Ilmu Pengetahuan Alam

Materi "Cahaya Dan Pemanfaatannya"

NIS	No.	Nama Siswa	Nilai	
			Pre-Test	Post-Test
972	1.	Adinda Rosa Hana	62	94
973	2.	Akmal Rizal	76	92
938	3.	Alfriz Nurvauziyah C.	68	88
942	4.	Balqis Basyasyah Naila	70	90
944	5.	Candra Kurniawan	68	92
948	6.	Faldo Yeri Sevanisa	52	96
980	7.	Fatahillah Tsabit Fatoni	80	100
949	8.	Iga Noventa Ramadhania	58	86
986	9.	Kameralda Naurah Aqilah	78	90
955	10.	Moch Patra Maulana	70	84
953	11.	Muhammad Naufal	78	92
954	12.	Muhammad Naufal Musyafa	68	90
988	13.	Muhammad Ridho	76	96
991	14.	Najah	70	92
958	15.	Nandita Auralia	86	96
992	16.	Nasywa Alf Putri	88	100
993	17.	Oka Luman Aryaguna	66	92
960	18.	Phalosafa Ghassani Zakirah	72	84
961	19.	Rahil Kamilia Sa'idah	70	88
965	20.	Ruri Kamaruzzaki	78	90
966	21.	Shakyla Irsya Faradisa	66	80
995	22.	Sulthan Rofiq Rabbani	78	84
968	23.	Yanuar Thaif Chalil	82	96
JUMLAH			1660	2092
RATA-RATA			**72,2**	**90,9**

Malang…….

Guru Bidang Studi

Wiwit Sri Widayati, S.Pd

CURRICULUM VITAE

Name : Juliana Ulfa

Date of Birth : Malang, 27 July 1993

Address : Jl. Dawuhan Nomor 244, RT 17 RW 05, Karangploso, Malang

E-mail : Juliaulfa203@yahoo.com

Phone : 085707601157

Educational Background:

a. **Formal Education**
   1. RA Ar-Rohmah at 1998-1999.
   2. MI Ar-Rohmah at 1999-2005.
   3. SMPN 01 Karangploso 2005-2008.
   4. MAN Malang II at 2008-2011.
   5. S1 Tarbiyah and Teaching Trainers Faculty, PGMI Department, The State Islamic University of Maulana Malik Ibrahim Malang at 2011-2015

b. **Non Formal Education**
   1. Madrasah Diniyah, Islamic Boarding School Hidayatut Tholibin
   2. Ma'had Sunan Ampel Al-Aly (MSAA) UIN Maulana Malik Ibrahim Malang

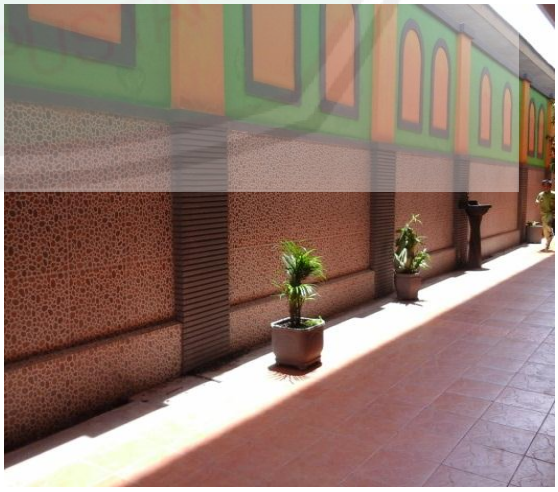
c. **Organization Background**
   1. Administrator of Education Department in HMJ PGMI UIN Malang at Period 2011-2012 and 2012-2013

2. Administrator of KOPRI Department in PMII Kawah Condrodimuko at Period 2011-2012
3. Administrator of Networking Department in PMII Kawah Condrodimuko at Period 2012-2013

d. Effort

1. Classroom Action Research (PTK) "Penerapan Metode Experiential Learning untuk Meningkatkan Hasil Belajar Ilmu Pengetahuan Alam Materi Sumber Energi pada Kelas II di MI Khadijah Malang". Januari-Februari 2015
2. Scientific Work (Thesis) "The Development of Science Instructional Materials Based on the Experiential Learning for Subject of the Light and Its Utilization at 5th Graders in MI Khadijah Malang. 2015

DOKUMENTASI FOTO LINGKUNGAN SEKOLAH



DOKUMENTASI FOTO UJI COBA LAPANGAN