DEVELOPMENT OF INSTRUCTIONAL SCIENCE MATERIAL BASED ON ENCYCLOPEDIA FOR 4TH GRADE AT SDI KARDINA MASSA BLITAR

THESIS

BY

AKMALA MUTOHAROH 11140066



TEACHING EDUCATION OF ISLAMIC ELEMENTARY SCHOOL DEPARTMENT TARBIYAH AND TEACHING TRAINING FACULTY MAULANA MALIK IBRAHIM STATE ISLAMIC UNIVERSITY OF MALANG

2015

DEVELOPMENT OF INSTRUCTIONAL SCIENCE MATERIAL BASED ON ENCYCLOPEDIA FOR 4TH GRADE AT SDI KARDINA MASSA BLITAR

THESIS

Presented to Tarbiyah and Teaching Training Faculty Maulana Malik Ibrahim State Islamic University of Malang in partial fulfillment of the requirement for the degree of Bachelor Education (S.Pd.I)

BY

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INTERNATIONAL CLASS PROGRAM TEACHING EDUCATION OF ISLAMIC ELEMENTARY SCHOOL DEPARTMENT TARBIYAH AND TEACHING TRAINING FACULTY MAULANA MALIK IBRAHIM STATE ISLAMIC UNIVERSITY OF MALANG

2015

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DEDICATION

This Thesis Is Dedicated To My Beloved Father And Mother

(Drs. Imam Muslim & Dra. Arin Nurul Ma'rifah)

"You are the persons who have been guided me, educated me from baby till now days. Every good things I do in this world is always dedicated to both of you. Because of you are my everything"

I LOVE YOU SO MUCH, MY GREAT FAMILY

My Beloved Husband

(Imam Fauzi, S.Pd)

Person who always give me support and always accompany me for doing this thesis till finished, thank you very much dear.

My Sister

(Wildania S.B)

Her laugh, her spirit, her happy makes my spirit grow back, thank you sista.

ΜΟΤΤΟ

أَوَلَمِ يَرَ ٱلَّذِينَ كَفَرُوٓاْ أَنَّ ٱلسَّمَوَٰتِ وَٱلْأَرْضَ كَانَتَا رَتَّقًا فَفَتَقَنَنَهُمَا وَجَعَلْنَا مِنَ ٱلْمَآءِ كُلَّ شَيْءٍ حَيٍّ أَفَلَا يُؤْمِنُونَ ٢

"And do those who unbelief see that the sky and the earth were of one piece, then We clove them asunder. And We made every living creatures from water. Why did they not believe?" (Q.S Al- Anbiya': 30)



Dr. H. Nur Ali, M.Pd

The Lecture of Tarbiyah and Teaching Training Faculty Maulana Malik Ibrahim State Islamic University of Malang

ADVISOR OFFICIAL NOTE

Matter: Thesis of Akmala MutoharohAppendixes: 4 (four) Exemplar

Dear,

Dean of Tarbiyah and Teaching Training Faculty Maulana Malik Ibrahim State Islamic University of 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 thesis:

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

Wassalamu'alaikum Wr. Wb

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STATEMENT LETTER

I hereby declare, that in this paper there is no work that has proposed to acquire a degree at a university, and the best of my knowledge, there is also no work ever written or opinions of others, except that in writing referred in this manuscript and mentioned in the bibliography.



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بسب _ لَلْهَ ٱلْرَجْلَ ٱلْرَجْبِ

Alhamdulillahi robbil alamin, all praises be to Allah SWT who has already given the mercies and blessing during my thesis writing process. Peace and salutation may always be given to our Prophet Muhammad SAW. I would like to thank to several contributive people in finishing my thesis entitled **Development** of Instructional Science Material Based on Encyclopedia for 4th Grade at SDI Kardina Massa Blitar I convey my indisputable to:

First of all, I would like to express my gratitude and thank to my beloved parents, Ayahanda Imam Muslim dan Ibu Arin Nurul Ma'rifah, for their prayer, support, love, and everything. You are the most motivated people for me. My husband Imam Fauzi thanks for your patient to company me finishing my thesis and also for my sister Wildania thanks for your kindness, cheerful and support. I am happy life with you all.

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Finally, may Allah always blessing us forever. The researcher do really realize that this thesis still needs some critics and suggestion from the reader in order to make it perfect and hopefully the arranging thesis can provide benefits, especially for researcher herself and readers in general.

> Malang, 3 November 2015 Akmala Mutoharoh

TRANSLATION GUIDELINES OF ARABIC LETTER

Translation of Arab Latin in this thesis utilize the translation guidelines based on the agreement between Religion Minister and Educational and Culture Minister of Indonesia number 158/1987 and number 0543b/ U/ 1987. Those are:

A. Letter

1	<	a	j	=	Z	ق	=	q
ب	=	b	س	Ē	s	بى 🕹	=	k
ت	2=	t	ش	4	sy	J	=	1
ث) =	ts	ص	=	sh	<u>م</u>	=	m
ى	=	j	ض	=	dl	じ	=	n
۲	=	<u>h</u>	ط	2	th	و	=	w
Ż	=	kh	ظ	=	zh	٥	=	h
د	=	d	٤	=	٢	۶	=	,
ذ	= (dz	ė	=	gh	ي	=	у
L	=	r	ف	-	f			

В.	Long Vowel	C. Diphth	ong V	owel
	Vocal (a) panjang = \hat{a}	أوْ	=	Aw
	Vocal (i) panjang = î	أيْ	=	Ay
	Vocal (u) panjang = \hat{u}	أوْ	=	û
		ای	=	î

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ABSTRACT

Mutoharoh, Akmala. 2015. Development of Instructional Science Material Based on encyclopedia for 4th Grade at SDI Kardina Massa Blitar. Thesis, Teaching Education of Islamic Elementary School Program, Faculty of Tarbiyah and Teaching Training, Maulana Malik Ibrahim State Islamic University of Malang. Advisor, Dr. H. Nur Ali, M.Pd

Usage of instructional material based on encyclopedia in learning process can create the concept of students' understanding of the material deeply, so that the learning process is going well. Instructional material based on encyclopedia is needed by the students because it can motivate students to learn optimally. However, conditions on the field is different with theory. Lack of student interest in learning caused by learning strategies are still monotonous and limited media/instructional material in learning process. It can be overcome by developing instructional materials to the curriculum 2013 which can be referred students to learn and expand knowledge based on natural science competence.

Purpose of this study is to determine the attractiveness of instructional material based on encyclopedia as it had developed, determine the level of validity of instructional material, and determine the effectiveness the usage of instructional material based on encyclopedia in improving learning achievement of 4th grade at SDI Kardina Massa Blitar.

To achieve the objectives above, used the methods of research and development (R & D), using the model design of Borg & Gall which has 10 steps in the procedure of development such as research and information collecting, planning, develop primary form of product, main field trial, product revision, preliminary field, operational product revision, field trial, dissimilation and implementation. Data collection with a questionnaire, interview, pre-test and posttest, observation.

Based on the results of research, the result consists of 1) the results of the analysis of questionnaire data from expert material get a percentage of 98% with a very valid criteria. 2) according to design experts get a percentage value of 90% with a very valid criteria. 3) according to the teachers as learning experts obtained the percentage of 92% and the attractiveness of the product based on the assessment and student responses obtained a percentage of 95.6%. 4) there are differences in learning achievement of 4th grade before and after use an instructional material based on encyclopedia. Students who sufficient the minimum standards of completeness gained 91.7% while the percentage of students who do not sufficient minimum standards gained 8.3% percentage. This suggests that the development of instructional material based on encyclopedia morphology of animals and plants around the house is valid, interesting and effective use in learning process.

Keywords: instructional material, encyclopedia

ABSTRAK

Mutoharoh, Akmala. 2015. Pengembangan Bahan Ajar Ilmu Pengetahuan Alam Berbasis Ensiklopedia untuk Siswa Kelas IV Di SDI Kardina Massa Blitar. Skripsi, Jurusan Pendidikan Guru Madrasah Ibtidaiyah, Fakultas Ilmu Tarbiyah dan Keguruan. Universitas Islam Negeri Maulana Malik Ibrahim Malang. Pembimbing: Dr. H. Nur Ali, M.Pd

Penggunaan bahan ajar berbasis ensiklopedia pada proses pembelajaran dapat menciptakan pemahahaman konsep siswa pada materi lebih mendalam, sehingga proses belajar berlangsung dengan baik. Bahan ajar berbasis ensiklopedia sangat dibutuhkan oleh siswa karena dapat memotivasi siswa belajar dengan optimal di sekolah. Namun, kondisi di lapangan berbeda dengan teori. Kurangnya minat siswa dalam belajar disebabkan oleh strategi pembelajaran yang masih monoton dan terbatasnya media belajar siswa. Hal ini bisa diatasi dengan cara mengembangkan bahan ajar pada kurikulum 2013 yang dapat dijadikan rujukan siswa untuk belajar dan memperluas wawasan terutama pada kompetensi dasar IPA.

Tujuan dari penelitian ini untuk mengetahui kemenarikan bahan ajar berbasis ensiklopedia sebagaimana yang telah dikembangkan, mengetahui tingkat validitas bahan ajar, dan mengetahui keefektifan penggunaan bahan ajar berbasis ensiklopedia dalam meningkatkan hasil belajar siswa kelas IV di SDI Kardina Massa Blitar.

Untuk mencapai tujuan di atas, digunakan metode penelitian pengembangan Research and Development (R & D), dengan menggunakan model Borg & Gall yang memiliki 10 langkah dalam prosedur pengembangannya diantaranya yaitu perencanaan, pengembangan draf produk, uji coba dan penyempurnaan produk awal, merevisi produk, uji coba lapangan, penyempurnaan produk hasil uji coba, uji pelaksanaan lapangan, penyempurnaan produk akhir, desimilasi dan implementasi.Pengumpulan datanya meliputi instrument angket, wawancara, observasi, pre-test dan post-test.

Berdasarkan hasil penilitian. Hasilnya terdiri dari 1) hasil analisis data angket dari ahli isi mendapatkan presentase 98% dengan kriteria sangat valid. 2) menurut ahli desain media pembelajaran mendapatkan nilai persentase 90% dengan kriteria sangat valid. 3) menurut guru kelas IV sebagai ahli pembelajaran diperoleh persentase 92% dan untuk uji coba kemenarikan produk berdasarkan penilaian dan tanggapan siswa diperoleh persentase sebesar 95.6%. 4) terdapat perbedaan hasil belajar siswa kelas IV sesudah dan sebelum menggunakan bahan ajar berbasis ensiklopedia. Siswa yang memenuhi standard ketuntasan minimum diperoleh persentase 91.7% sedangkan siswa yang belum memenuhi standard minimum diperoleh persentase 8.3%. Hal ini menunjukkan bahwa pengembangan bahan ajar berbasis ensiklopedia pada materi morfologi hewan dan tumbuhan di sekitar rumah adalah valid, menarik dan efektif digunakan dalam pembelajaran.

Kata Kunci: bahan ajar, ensiklopedia

مستخلص البحث

مطهرة، أكمل. ٢٠١٥. تطوير المواد الدراسية على أساس دائرة المعارف العلوم الطبيعية لفصل الرابع في المدرسة الإبتدائية كردينا ماسا الإسلامية بليتار. البحث الجامعي في قسم تعليم المعلم للمدرسة الإبتدائية، كلية علوم التربية والتعليم بجامعة مولانا مالك إبراهيم الإسلامية الحكومية مالانج. المشرف: الحاج نور على الماجستير.

استخدام المواد الدراسية على أساس دائرة المعارف في عملية التعليم يخترع فهم صيغة الطلاب على المادة المتعمقة ويكون عميلة التعليم يسير سيرا. كان المواد الدراسية على أساس دائرة المعارف احتاج هاما للطلاب لأن تشجيع التعلم لطالب في المدرسة. بل، حالة في الميدان يختلف بالنظرية. وينخفض رغبة الطلاب في التعلم يسبب استراتيجية التعليم مازالت تقليدية ووسيلة التعليم للطلاب محدود. فلذلك، بتطوير الكتاب التعليمي على المنهج ٢٠١٣ يكون توجيه التعلم وتوسيع المعرفة على الكفاءات الأساسية لعلم الطبيعة خاصة.

تحدف هذا البحث ليعرف اهتمام المواد الدراسية على أساس دائرة المعارف الذي تطورت، ويعرف صدق الكتاب التعليمي و يعرف فعالية استخدام المواد الدراسية على أساس دائرة المعارف لترقية نتيجة التعليم للطلاب الفصل الرابع في المدرسة الإبتدائية كردينا ماسا الإسلامية بليتار.

ويستخدم هذا البحث البحث والتطويري (R&D) باستخدام نموذج بروك وكول ليبلغ الأهداف السابقة، كان نموذج بروك وكول يتكون من عشر خطوات في عملية التطوير، وهي: التخطيط، تطوير الإنتاج، تجربة الإنتاج وتعديل الإنتاج الأساسى، الإصلاحات الأولى، تنفيد التجربة الميدانية، وتعديل الإنتاج، التجربة الميدانية الثاني، تعديل الإنتاج النهائي، النظرية والتطبيق. استخدمت الباحثة أدوات جمع البيانات باستبانة لخبير المضمون و خبير تصميم الكتاب وخبير التعليم وللطلاب واختبار قبل وبعد.

تأسيسا على نتيجة البحث، أما نتيجة هذا البحث فهي: ١) نتيجة تحليل البيانات من الاستبانة من خبير المضمون للحصول بدرجة ٩٠% بمعيار الصدق ٢) ويحصل درجة ٩٠% بمعيار الصدق من خبير تصميم وسيلة التعليم. ٣) ويحصل درجة ٩٢% من مدرس الفصل الرابع كخبير التعليم ودرجة ٢,٥٩% من نتيجة الاستبانة الطلاب. ٤) وهناك الإختلاف في نتيجة التعليم لطلاب الفصل الرابع على استخدام المواد الدراسية على أساس دائرة المعارف وعدم استخدامه. والطالب الذي يبلغون معيار كمال الأدنى يحصلون بدرجة ٥,٩% وأما الطلاب الذي لم يبلغوا معيار كمال الأدنى يحصلون بدرجة ٥,٣%. وهذا يدل على تطوير المواد الدراسية على أساس دائرة المعارف في مادة الصرف للحيوان والنبات حول البيت فهي الصدق وجذابة وفعالة لاستعمال في على أساس دائرة المعارف في مادة الصرف للحيوان والنبات حول البيت فهي الصدق وجذابة وفعالة لاستعمال في عملية التعليم.

الكلمة الرئيسية: المواد الدراسية، دائرة المعارف

ABSTRACT

Mutoharoh, Akmala. 2015. Development of Instructional Science Material Based on encyclopedia for 4th Grade at SDI Kardina Massa Blitar. Thesis, Teaching Education of Islamic Elementary School Program, Faculty of Tarbiyah and Teaching Training, Maulana Malik Ibrahim State Islamic University of Malang. Advisor, Dr. H. Nur Ali, M.Pd

Usage of instructional material based on encyclopedia in learning process can create the concept of students' understanding of the material deeply, so that the learning process is going well. Instructional material based on encyclopedia is needed by the students because it can motivate students to learn optimally. However, conditions on the field is different with theory. Lack of student interest in learning caused by learning strategies are still monotonous and limited media/instructional material in learning process. It can be overcome by developing instructional materials to the curriculum 2013 which can be referred students to learn and expand knowledge based on natural science competence.

Purpose of this study is to determine the attractiveness of instructional material based on encyclopedia as it had developed, determine the level of validity of instructional material, and determine the effectiveness the usage of instructional material based on encyclopedia in improving learning achievement of 4th grade at SDI Kardina Massa Blitar.

To achieve the objectives above, used the methods of research and development (R & D), using the model design of Borg & Gall which has 10 steps in the procedure of development such as research and information collecting, planning, develop primary form of product, main field trial, product revision, preliminary field, operational product revision, field trial, dissimilation and implementation. Data collection with a questionnaire, interview, pre-test and posttest, observation.

Based on the results of research, the result consists of 1) the results of the analysis of questionnaire data from expert material get a percentage of 98% with a very valid criteria. 2) according to design experts get a percentage value of 90% with a very valid criteria. 3) according to the teachers as learning experts obtained the percentage of 92% and the attractiveness of the product based on the assessment and student responses obtained a percentage of 95.6%. 4) there are differences in learning achievement of 4th grade before and after use an instructional material based on encyclopedia. Students who sufficient the minimum standards of completeness gained 91.7% while the percentage of students who do not sufficient minimum standards gained 8.3% percentage. This suggests that the development of instructional material based on encyclopedia morphology of animals and plants around the house is valid, interesting and effective use in learning process.

Keywords: instructional material, encyclopedia

ABSTRAK

Mutoharoh, Akmala. 2015. Pengembangan Bahan Ajar Ilmu Pengetahuan Alam Berbasis Ensiklopedia untuk Siswa Kelas IV Di SDI Kardina Massa Blitar. Skripsi, Jurusan Pendidikan Guru Madrasah Ibtidaiyah, Fakultas Ilmu Tarbiyah dan Keguruan. Universitas Islam Negeri Maulana Malik Ibrahim Malang. Pembimbing: Dr. H. Nur Ali, M.Pd

Penggunaan bahan ajar berbasis ensiklopedia pada proses pembelajaran dapat menciptakan pemahahaman konsep siswa pada materi lebih mendalam, sehingga proses belajar berlangsung dengan baik. Bahan ajar berbasis ensiklopedia sangat dibutuhkan oleh siswa karena dapat memotivasi siswa belajar dengan optimal di sekolah. Namun, kondisi di lapangan berbeda dengan teori. Kurangnya minat siswa dalam belajar disebabkan oleh strategi pembelajaran yang masih monoton dan terbatasnya media belajar siswa. Hal ini bisa diatasi dengan cara mengembangkan bahan ajar pada kurikulum 2013 yang dapat dijadikan rujukan siswa untuk belajar dan memperluas wawasan terutama pada kompetensi dasar IPA.

Tujuan dari penelitian ini untuk mengetahui kemenarikan bahan ajar berbasis ensiklopedia sebagaimana yang telah dikembangkan, mengetahui tingkat validitas bahan ajar, dan mengetahui keefektifan penggunaan bahan ajar berbasis ensiklopedia dalam meningkatkan hasil belajar siswa kelas IV di SDI Kardina Massa Blitar.

Untuk mencapai tujuan di atas, digunakan metode penelitian pengembangan Research and Development (R & D), dengan menggunakan model Borg & Gall yang memiliki 10 langkah dalam prosedur pengembangannya diantaranya yaitu perencanaan, pengembangan draf produk, uji coba dan penyempurnaan produk awal, merevisi produk, uji coba lapangan, penyempurnaan produk hasil uji coba, uji pelaksanaan lapangan, penyempurnaan produk akhir, desimilasi dan implementasi.Pengumpulan datanya meliputi instrument angket, wawancara, observasi, pre-test dan post-test.

Berdasarkan hasil penilitian. Hasilnya terdiri dari 1) hasil analisis data angket dari ahli isi mendapatkan presentase 98% dengan kriteria sangat valid. 2) menurut ahli desain media pembelajaran mendapatkan nilai persentase 90% dengan kriteria sangat valid. 3) menurut guru kelas IV sebagai ahli pembelajaran diperoleh persentase 92% dan untuk uji coba kemenarikan produk berdasarkan penilaian dan tanggapan siswa diperoleh persentase sebesar 95.6%. 4) terdapat perbedaan hasil belajar siswa kelas IV sesudah dan sebelum menggunakan bahan ajar berbasis ensiklopedia. Siswa yang memenuhi standard ketuntasan minimum diperoleh persentase 91.7% sedangkan siswa yang belum memenuhi standard minimum diperoleh persentase 8.3%. Hal ini menunjukkan bahwa pengembangan bahan ajar berbasis ensiklopedia pada materi morfologi hewan dan tumbuhan di sekitar rumah adalah valid, menarik dan efektif digunakan dalam pembelajaran.

Kata Kunci: bahan ajar, ensiklopedia

مستخلص البحث

مطهرة، أكمل. ٢٠١٥. تطوير المواد الدراسية على أساس دائرة المعارف العلوم الطبيعية لفصل الرابع في المدرسة الإبتدائية كردينا ماسا الإسلامية بليتار. البحث الجامعي في قسم تعليم المعلم للمدرسة الإبتدائية، كلية علوم التربية والتعليم بجامعة مولانا مالك إبراهيم الإسلامية الحكومية مالانج. المشرف: الحاج نور على الماجستير.

استخدام المواد الدراسية على أساس دائرة المعارف في عملية التعليم يخترع فهم صيغة الطلاب على المادة المتعمقة ويكون عميلة التعليم يسير سيرا. كان المواد الدراسية على أساس دائرة المعارف احتاج هاما للطلاب لأن تشجيع التعلم لطالب في المدرسة. بل، حالة في الميدان يختلف بالنظرية. وينخفض رغبة الطلاب في التعلم يسبب استراتيجية التعليم مازالت تقليدية ووسيلة التعليم للطلاب محدود. فلذلك، بتطوير الكتاب التعليمي على المنهج ٢٠١٣ يكون توجيه التعلم وتوسيع المعرفة على الكفاءات الأساسية لعلم الطبيعة خاصة.

تحدف هذا البحث ليعرف اهتمام المواد الدراسية على أساس دائرة المعارف الذي تطورت، ويعرف صدق الكتاب التعليمي و يعرف فعالية استخدام المواد الدراسية على أساس دائرة المعارف لترقية نتيجة التعليم للطلاب الفصل الرابع في المدرسة الإبتدائية كردينا ماسا الإسلامية بليتار.

ويستخدم هذا البحث البحث والتطويري (R&D) باستخدام نموذج بروك وكول ليبلغ الأهداف السابقة، كان نموذج بروك وكول يتكون من عشر خطوات في عملية التطوير، وهي: التخطيط، تطوير الإنتاج، تجربة الإنتاج وتعديل الإنتاج الأساسى، الإصلاحات الأولى، تنفيد التجربة الميدانية، وتعديل الإنتاج، التجربة الميدانية الثاني، تعديل الإنتاج النهائي، النظرية والتطبيق. استخدمت الباحثة أدوات جمع البيانات باستبانة لخبير المضمون و خبير تصميم الكتاب وخبير التعليم وللطلاب واختبار قبل وبعد.

تأسيسا على نتيجة البحث، أما نتيجة هذا البحث فهي: ١) نتيجة تحليل البيانات من الاستبانة من خبير المضمون للحصول بدرجة ٩٠% بمعيار الصدق ٢) ويحصل درجة ٩٠% بمعيار الصدق من خبير تصميم وسيلة التعليم. ٣) ويحصل درجة ٩٢% من مدرس الفصل الرابع كخبير التعليم ودرجة ٢,٥٩% من نتيجة الاستبانة الطلاب. ٤) وهناك الإختلاف في نتيجة التعليم لطلاب الفصل الرابع على استخدام المواد الدراسية على أساس دائرة المعارف وعدم استخدامه. والطالب الذي يبلغون معيار كمال الأدنى يحصلون بدرجة ٥,٩% وأما الطلاب الذي لم يبلغوا معيار كمال الأدنى يحصلون بدرجة ٥,٣%. وهذا يدل على تطوير المواد الدراسية على أساس دائرة المعارف في مادة الصرف للحيوان والنبات حول البيت فهي الصدق وجذابة وفعالة لاستعمال في على أساس دائرة المعارف في مادة الصرف للحيوان والنبات حول البيت فهي الصدق وجذابة وفعالة لاستعمال في عملية التعليم.

الكلمة الرئيسية: المواد الدراسية، دائرة المعارف

CHAPTER I

INTRODUCTION

A. Background

Student achievement in school is often indicated with learning problems of students in understanding the material. Indication is made possible because of factors studied were less effective, even the students themselves do not feel motivated in following lessons. As a result, students do not understand the material that is difficult given by the teacher. In this case the teacher as developer of science has a big role to implement of learning, especially on the subjects of Natural Sciences precise and efficient.¹

Natural Sciences is the study of objects that exist in nature, both of which can be observed with the senses and which can't be observed with the senses. Natural science is not only as a subject, but also as an educational tool as state in Bloom's taxonomy, that

IPA diharapkan dapat memberikan pengetahuan (kognitif), yang merupakan tujuan utama dari pembelajaran. Jenis pengetahuan yang dimaksud adalah pengetahuan dasar dari prinsip serta materi yang bermanfaat untuk kehidupan sehari-hari. Pengetahuan secara garis besar tentang fakta yang ada di alam untuk dapat memahami dan memperdalam lebih lanjut, dan melihat adanya keterangan serta keteraturannya. Di samping hal itu, pembelajaran sains diharapkan pula memberikan keterampilan (psikomotorik), kemampuan sikap ilmiah (afektif), pemahaman, kebiasaan dan apresiasi. Di dalam mencari jawaban terhadap suatu permasalahan. Karena ciri-ciri tersebut yang membedakan dengan pembelajaran lainnya.²

¹ Daryanto, Media Pembelajaran, (Bandung: Satu Nusa, 2010), page. 1

² Trianto, Model Pembelajaran Terpadu, (Jakarta: Bumi Aksara, 2010), page. 142

From this statement, natural science can achieve the learning objectives that provide cognitive knowledge. The knowledge is about base of knowledge and materials for everyday life. Broadly speaking, discuss knowledge about the fact that there is in nature to be studied and understood more, because it can provide skills (psychomotor), the ability of the scientific attitude (affective), understanding, and appreciation in the habit of answering a problem.

Based on Piaget's theory of learning that the student of elementary school includes in the concrete operational stage is between 7-11 years of age. At this stage it is beginning to think rationally, that the child has the logical operations that can be applied to concrete problems. Operations in this period related to the individual experience and is not a formal concrete because children are not able to deal with abstract material, such hypotheses and propositions verbally.³

Thus, the Natural Sciences learning particularly in primary schools put more emphasis on the provision of direct experience in daily life, so that students can find the facts, concepts, theories and scientific attitude can be a positive influence on the quality of education and educational products.

Based on experience in the field, the results of science learning in MI/SD still shows some weaknesses. The weakness of this learning is more emphasis on the mastery of a number of facts and concepts, as less facilitating students to have a broad learning outcomes and complete. The

³ Ratna Wilis Dahar, *Teori-teori Belajar*, (Jakarta: Erlangga, 1989), page. 154

overall objectives and characteristics relating to education of Natural Sciences in SD/ MI to be just transfer of concepts that for the next became memorizing material for students, learning science for often is only implemented in the form of exercises completion of the questions that solely to achieve the target value written test in the evaluation of learning outcomes are student achievement and teacher success in managing the class.

Based on the problems above, need for solving the problem as the solution to make better learning of natural science. The solution to overcome this problem is to develop instructional materials that aims to help learners achieve competence, expand knowledge about science and facilitate students in understanding the material in the instructional materials.

Instructional materials in learning is one of the factors that give affect for a quality of education as an important media of instructional materials to stimulate students' learning activities. Interaction with the media this is actually a concrete manifestation of follow up learning.⁴

Availability of instructional materials in accordance with the level of development of learners is important for students and teachers in the learning process. For students, a source of instructional materials reference that can be taken to learn the information. As for the teacher, the textbook used to obtain information about the development of instructional materials

⁴ I Nyoman Sudana Degeng, *Ilmu Pengajaran Taksonomi Variabel*, (Jakarta: Depdikbud Dirjen Perguruan Tinggi Proyek Pengembangan Lembaga Pendidikan Tenaga Kependidikan, 1989), page. 150

that can be developed by teachers to assist him in carrying out learning activities. This set out in the Education Law 11 of 2005, that is:⁵

Buku pelajaran merupakan buku acuan wajib untuk digunakan di sekolah yang memuat materi pembelajaran dalam rangka peningkatan keimanan dan ketaqwaan, budi pekerti dan kepribadian, kemampuan penguasaan ilmu pengetahuan dan teknologi, kemampuan dan kepekaan estesis, potensi fisik dan kesehatan yang disusun berdasarkan standar nasional pendidikan (BSNOP). "

From the explanation above, textbooks in schools is one of the textbook, which shall be used by the students because it contains materials to improve the moral and spiritual education, such as the increase of faith and devotion, character and personality, ability mastery of science and technology, ability and sensitivity aesthesis, health and physical potential.

Based on the observations and interviews conducted by Headmaster of SDI Kardina Masa, Mr. Khoirul Anam, M.Pd shows that the instructional materials used by teachers and students only based on thematic book and worksheet of national education.⁶ Limitations of supporting media that makes teachers difficult in presenting the material, especially on the material morphology flora and fauna in home environment on the 3rd theme. Because picture on the textbook is from animated images and uncompleted. Meanwhile, students also need a real picture and review material that is broader than the material.

Looking at the description above, the materials of morphology flora and fauna in home environment on 3^{rd} theme need an instructional materials

⁵ UU SISDIKNAS 11 tahun 2005

⁶ Interview with the headmaster of SDI Kardina Masa Blitar in the office at 14 Oktober

that are able to present a real picture of the environment and its morphology beings and material complete, clear and detailed. Therefore, the researcher wants to present instructional science materials with different shades for students. In this case, the researcher tried to present instructional science materials based on encyclopedia to the students. The goal is as complement existing instructional materials as an instructional science material is presented in full detail, concrete, interesting, and appropriate core competencies, basic competencies and indicator.

Encyclopedia is a collection of explanations of words that contains information widely, complete, and of course easy for us to understand it on a collection of knowledge or a particular branch of science which is based on word or alphabets then printed into textbook.⁷

In education, the encyclopedia is very important especially in science materials, because encyclopedia gives many information such as a concrete pictures that is easy to understand and be understood by learners when compared to the textbook. In addition, the encyclopedia also presented in alphabetical order / grouping, resulting in the encyclopedia easier to use. But in this development, encyclopedias need many information because it presents information which is accurate and detail.

In relation with the explanation above, the researcher is interesting in developing a research topic on the development of instructional materials

⁷ Anne Ahira, Pengertian dan Perkembangan Ensiklopedia, (http://www.anneahira.com/ensiklopedia.htm, diakses tanggal 10 Oktober 2014)

entitled "Development of Instructional Sciences Material Based on Encyclopedia for 4th Grade at SDI Kardina Masa Blitar".

B. Problem Formulation

Based on the background above, than the problems can be formulated as follows:

- How to develop an instructional science materials based on encyclopedia material of morphology flora and fauna in home environment for 4th grade at SDI Kardina Masa Blitar?
- 2. How the effectiveness and attractiveness of instructional science materials based on encyclopedia material of morphology flora and fauna in home environment for 4th grade at SDI Kardina Masa Blitar?
- 3. How is the result of teaching learning of instructional science materials based on encyclopedia material of morphology flora and fauna in home environment for student achievement of 4th grade at SDI Kardina Masa Blitar?

C. Development Goals

Based on problems formulation that has been described, the research objectives of this development are:

 Describe how to develop an instructional science materials based on encyclopedia material of morphology flora and fauna in home environment for 4th grade at SDI Kardina Masa Blitar.

- Describe the effectiveness and attractiveness of instructional science materials based on encyclopedia material of morphology flora and fauna in home environment for 4th grade at SDI Kardina Masa Blitar.
- Describe the result of teaching learning of development instructional science materials based on encyclopedia material of morphology flora and fauna in home environment for student achievement of 4th grade at SDI Kardina Masa Blitar.

D. Development Benefits

After noticing the problem and research objectives above, research on this development is expected to provide the following benefits:

1. Theoretical Benefit

Theoretically, the development of instructional science materials based on encyclopedia material of morphology flora and fauna in home environment is expected to contribute to the field of teacher science of primary school can also provide exciting new innovations in the development of instructional materials.

2. Practical Benefit

Practically, this research is useful for:

a. School

Given this research, it could provide a new reference textbook that is expected to improve the quality of science learning and can improve student achievement. b. Teacher

Providing experience to the teacher in preparing learning tools and that experiences can be used as a reference for learning to develop devices with other materials.

c. Student

In this study, it can provide an ambience of learning different for students. Adding a reference reading also motivate students and learning impact on improving learning achievement.

d. Researcher

Increase knowledge and insights of researchers in designing, making, and evaluating the development of instructional materials based on encyclopedia with material morphology flora and fauna as to measure the effectiveness of the instructional materials that have been made.

E. Specifications Products Developed

The resulting product is the form of instructional materials of Natural Sciences for 4th grade at SDI Kardina Masa Blitar limited in 3rd theme 1st subtheme flora and fauna in home environment can be used by students and teacher for instructional science materials, namely with the following product specifications:

- 1. Physic
 - a. Physical appearance of the resulting product in this development is the form of print media such as textbooks (material printed).

- b. Description of the contents of the book using A4 size paper with the dimensions of heavy paper and use different font and size. The layout of text and pictures arranged in various ways so that students are interested in reading it. Front and back cover designed as attractive as possible so that students are interested in reading it. Pictures used in the form of photos of real objects that are supported by other animated images. It aims to create points attractiveness of the students in the textbook. The language used dialogical resulting in positive interaction that occurs between the student textbook.
- c. The Handbook is designed based on the material encyclopedia in which living creatures include materials on humans, animals, and plants as well as review materials are complete, clear, and detailed. In each theme is designed with colors and different layout and full color. At each end there is a discussion of the evaluation of the extent to which students' understanding of the material has been read.

2. Contents

- a. At the beginning of this encyclopedia, the writer wrote the foreword
- b. The writer also describe 10 procedure of the development of this encyclopedia so that the readers understand the steps to design development of Borg & Gall which used by researcher in developing this product.
- c. The basic competence and indicator are also presented by researcher at the beginning of this encyclopedia so that the development of this encyclopedia does not seem inconsequential and has no basis.
- d. Map concept presented for the reader to easily view and understand the contents of the encyclopedia.
- e. Guidelines for the user is presented in this book the writer intended that the reader easily understand the basic content of the book, before the reader read the entire contents of this encyclopedia.
- f. List the contents of encyclopedia is also designed interesting, the writer provide an image corresponding to the content on that list.
- g. The writer also explains the notion of animal and plant morphology briefly and clearly at the beginning of encyclopedia. So that the reader can understand the definition of morphology animal and plant properly.
- h. The writer present material in this encyclopedia limited to material science on 3rd theme 1st subtheme "Animals and plants in the home environment" for class 4 at SDI Kardina Massa Blitar. The material contained in it, among others:
 - 1. Chicken
 - 2. Duck
 - 3. Cow
 - 4. Paint
 - 5. Bee
 - 6. Spider g. Pigeon

- 7. Rabbit
- 8. Mouse
- 9. Dog
- 10. Plant
- i. On the first page of each chapter, the writer describes briefly and clearly about the material. On the next page, researcher began to explain the functions of each part of the body of the animal and plant briefly and clearly, with language that is easily understood for students.
- j. In this encyclopedia, the writer also wrote "Serba-serbi" or hot news or the latest news about the animals and plants, so that the readers know the latest information about the animals and plants above.
- k. The writer also complementary sources of origin of the authors collected all the material / information relating to the matter, either in the form of a web of the Internet or from other Literature.
- Researcher also complementary this book with the evaluation "Uji Kemampuan" aimed to measure the students' ability to think and remember for understanding material that has been previously read. Problems were made aiming to increase students' understanding of the concept of animal and plant morphology.
- m. In some chapters, the writer create a form experiment that aims to provide opportunities for students to perform a simple experiment in the school environment. Because observation is one of the core competencies that must be achieved by students.

- n. The writer makes a useful glossary as a dictionary or if the readers do not understand the vocabulary in the material, the reader can see that vocabulary in the glossary located at the end of this encyclopedia.
- o. The writer also complete with a bibliography of the author as a references.

F. Importance of Development

The development of students' reasoning abilities of scientist material depends on the way in which the teacher in the implementation of learning. The way in which teachers in the implementation of learning that one of the concepts presented can be adapted by students called learning approach. Learning approach that is able to develop mathematical reasoning skills students are learning approach that can accommodate the process and activities of students in the class.

The task of the teacher, as stated in the Law of Teachers and Lecturers Number 14 Year 2005 Section 8 states that "Teachers must have academic qualifications, competence, certification of educators, physical and spiritual health as well as have the ability to achieve national education goals". As stated in the act referred to the competence of teachers that includes pedagogical competence, personal competence, professional competence and social competence. Therefore, a teacher must be able to plan and manage learning well.

At this time stated that the curriculum should be able to optimize the learning process of all activities of students based on the capabilities of the students. So the teacher has the task of learning to plan, implement learning, evaluate, analyze, follow up as well as professional development.

In planning lessons the teacher needs to create a resource. Instructional materials is a set of written materials prepared or not allowing the students to learn. But the reality on the ground that most teachers still use instructional materials created by others, instant, ready-made and ready to use. It seems that the teacher did not bother to develop their creativity and lack of planning, preparing and developing instructional materials independently. Though, there are several reasons that require a teacher to develop instructional materials are instructional materials in accordance with the demands of the curriculum, target characteristics and demands of learning problem solving.

Ready made of learning material or developed by others are often not suitable for students and does not match the curriculum. It will also include instructional materials are difficult to be understood by students and teachers can't explain it. Therefore it should be as a teacher to develop their own instructional materials appropriate to the curriculum in 2013.

G. Assumptions and Limitations of Development

1. Assumptions

Development of instructional science materials, there are assumptions that underlie the development of materials science such us:

- a. The main purpose of science learning is to develop knowledge and understanding of the concepts of natural science that is useful and can be applied in everyday life.
- b. The use of this instructional science material is expected to help students to be more active in study, providing a learning experience that cannot be separated from the context of the real world and help students to think more critically.
- c. Instructional material with morphology flora and fauna, students are expected to obtain information and to foster a sense of attraction for students will be a specific topic.
- d. By instructional materials based encyclopedia material morphology flora and fauna, students learning to become more regular.
- e. Instructional science material based on encyclopedia hope can improve the effectiveness of the learning process and improve learning outcomes of students'.
- 2. Limitations of Development
 - a. Discussion of the material.

The development of instructional materials to this encyclopedia is limited based on subjects Natural Science for students of 4^{th} grade in 1^{st} semester on the 3^{rd} theme 1^{st} subtheme "Flora and fauna in home environment" which consists of the subject:

- 1) Chicken
- 2) Duck
- 3) Cow

- 4) Cat
- 5) Bee
- 6) Spider
- 7) Pigeon
- 8) Rabbit
- 9) Mouse
- 10) Dog
- 11) Plant
- b. Object of research

The object of the research is students 4th grade at SDI Kardina Masa

c. Location of research

SDI Kardina Masa on Jl. Kalimantan No.111 Blitar

d. Presentation of the contents of this encyclopedia based on morphology flora and fauna in home environment.

H. Restricting Scope of Term

In order to avoid miss understandings in this research, definitions of terms related to research would be expressed as follows:

a. Development is the process of translating or outlines design specifications into specific forms.⁸ In this study, the development is a systematic process in developing material based on level of Natural Science at primary school/Islamic primary school curriculum based on 2013.

⁸ Fitratul Uyun, Pengembangan Bahan Ajar Pembelajaran Al-Qur'an Dengan Pendekatan Hermeneutik Bagi Kelas 5 MIN 01 Malang, (Malang: Tesis Program Studi Pendidikan Guru Madrasah Ibtidaiyah, UIN Maulana Malik Ibrahim Malang, 2010)

- b. Instructional materials is a matter of learning which has physical properties (which can be observed, not the ideas or concepts) that are used to facilitate the learning process.⁹ Learning materials referred to in this research is the textbook for 4th grade at SDI Kardina Massa Blitar in material morphology flora and fauna in home environment.
- c. Encyclopedia is a collection of explanations of words that describes the information widely, complete, and of course easy for we understand about the science or a particular branch of science that are arranged based on the letters or the alphabet which was word printed into a book.¹⁰

I. **Previous Research**

Related this research to the development of these instructional materials, studies conducted on several previous thesis and the thesis contained in some colleges.

Thesis by the title "Pengembangan Bahan Ajar Ilmu Pengetahuan Alam Materi Cahaya Dengan Pendekatan Keterampilan Proses Siswa Kelas V MI Miftahul Huda Kedung Bunder". This thesis was written by Ammalia fitriani in 2013 Teacher Science of Islamic Primary School UIN Malang.¹¹ According to the researchers, this thesis more emphasis on the skills of

⁹ Ririn Suneti, Pengembangan bahan Ajar Pembelajaran Akhlaqul Karimah Berbasis Pertanyaan (Studi di MTs Muhammadiyah 1 dan SMPN 14 Malang), Tesis. Program Studi Manajemen Pendidikan Islam. UIN Malang. 2007)

¹⁰ Anne Ahira, Pengertian dan Perkembangan Ensiklopedia,

⁽http://www.anneahira.com/ensiklopedia.htm, diakses tanggal 10 Oktober 2014) ¹¹ Ammalia Fitriani, Pengembangan *Bahan Ajar Ilmu Pengetahuan Alam Materi Cahaya* Dengan Pendekatan Keterampilan Proses Siswa Kelas V MI Miftahul Huda Kedung Bunder, (Malang: Skripsi Program Studi Sarjana Pendidikan Guru Madrasah Ibtidaiyah, UIN Malang, 2013)

students in the process of learning science so that students are able to understand the basic concepts in the learning material of science correctly.

Thesis written by Fitratul Uyun, Elementary School teacher education in 2010 with the title "*Pengembangan Bahan Ajar Pembelajaran Al-Qur'an Dengan Pendekatan Hermeneutik Bagi Kelas 5 MIN 01 Malang*" that produce learning materials Qur'an Hadith with a learning material through hermeneutic approaches.¹²

Thesis written by Anita anggraini with the title "*Pengembangan Bahan ajar Berbasis Ensiklopedia dan CD Pembelajaran Materi Daur Hidup Hewan kelas IV MI Bahrul Ulum Batu*". This thesis develops learning materials of science based on materials life cycle of animals for students of 4th grade MI Bahrul Ulum Batu. According to the researchers, this thesis more emphasis on students ' understanding of the materials of life cycle animal, so the students have high imagination to science concept.¹³

Tabe	el 1.1	
The differences	and	similarities

TITLE	SIMILARITIES	DIFFERENCES
Development of	Developing	• Presentation of the
Material science	instructional	contents of instructional
with light material	material and	material of light trough
trough processing	produce learning	processing skill
skill approach for	material	approach which
students of 5 th grade		developed in students as
MI Miftahul Huda		a provision for the
Kedung Bunder.		development of the next

¹² Fitratul Uyun, *Op,.cit,*.

¹³Anita Anggraini, Pengembangan Bahan ajar Berbasis Ensiklopedia dan CD Pembelajaran Materi Daur Hidup Hewan kelas IV MI Bahrul Ulum Batu, 2013. (Malang: Skripsi Program studi Pendidikan Guru Madrasah Ibtidaiyah, UIN Malang, 2013)

		self
Development of learning material in for Al-Qur'an learning trough hermeneutik approach for student 5 th grade in MIN 01 Malang	 Developing instructional material and produce instructional material Use Walter Dick and Carrey design of development Limitation design on semester 	 Product of instructional material is textbook of Al-Qur'an Hadith Presentation of the content trough hermeneutic approach Scope of instructional material include material of Qur'an Hadith with the subject of Sura al-Kafirun, al-Ma'un, at-Takastur, Hadith and loving orphans
Development of instructional material based on Encyclopedia and CD learning materials life cycle of animals for 4 th grade MI Bahrul Ulum Batu	• Developing instructional materials and produce science instructional material based on encyclopedia.	 Presentation of the content based on encyclopedia including science and encyclopedia of cycle animals There is a supporting media, CD learning of <i>Macromedia flash</i>

CHAPTER II

STUDY OF LITERATURES

A. Definition of Development

The definition of development in general means is growth, gradually change (evolution), and changes step by step. Then, this understanding applied in a variety of branch study and different practice. Whereas in the field of learning technology (Instructional technology, development has special meaning. According to the Seels & Richey, the development process as a means of translating or draft specification lays out into physical form. Or, with another expression, the development means the process of producing instructional materials.¹

According to Fitratul Uyun, development in the scope of the learning process is to translate design specifications into a specific physical shape. The design specification of the translation process includes the identification of problem formulation of learning objectives, the development of strategies or methods of learning and evaluation of the effectiveness, efficiency and exciting learning.²

The implementation of research and development, there are several methods used, there are methods: descriptive, evaluative, and experimental. Descriptive research method, used in the initial research to gather data about

¹ Punaji Setyosari, Metode Penelitian Pendidikan dan Pengembangan. (Jakarta: Kencana, 2010), page 218-219 ² Fitratul, Uyun, *Op. Cit.*.

the existing conditions. Evaluative methods, is used to evaluate the tests development process of a product. The product was developed through a series of trials, and trials were held every activity evaluation, assessment and evaluation of both processes. Based on the findings of the trial results held the consummation-the consummation. Experimental methods used to test the efficacy of the product produced.

B. Instructional Materials

1. Definition of Instructional Materials

Instructional material according to Pannen, materials or subject are arranged systematically used by teachers and students in the learning process.³ Muhaimin in modules of insight instructional materials development reveals that instructional materials are any materials used to help teachers/instructors in the learning activities.

Meanwhile, according to Abdul Majid, instructional materials are any materials, information, tools and text that is used to help the teacher/instructor in carrying out activities of teaching and learning. The material means could be written or unwritten materials. Instructional materials or materials curriculum (curriculum material) is the content or payload of the curriculum that must be understood by the students in an effort to achieve the objectives of the curriculum.⁴

³ Dikutip oleh Tian Belawati dalam Materi Pokok Pengembangan Bahan Ajar Edisi ke Satu (Jakarta: Universitas Terbuka, 2003), page. 3

⁴ Abdul Majid, *Perencanaan Pembelajaran: Mengembangkan Standar Kompetensi Guru*, (Bandung: Remaja Rosdakarya, 2007), page.173

Instructional materials or materials generally consists of knowledge, skills, and attitudes that students should be studied in order to achieve the standards of competence have been determined. In detail, the kinds of instructional materials consist of knowledge (facts, concepts, principles, procedures), skill, and attitude or a value to be learnt students in order to achieve the standards of competence have been determined. Curriculum materials or materials can be sourced from various disciplines that social science (social science) and the natural sciences (natural science). Further to note is how the scope and breadth and depth of the material or content in any field of study.

2. Function of Instructional Materials

Instructional material in learning context is one of the components that should be there, since the instructional material is a component that must be examined, observed, studied and made of material that will be covered by the student and at once can give you guidelines to learn them. Without the instructional material it will not produce anything.

Instructional material are the external factors that students are capable of strengthening the internal motivation to learn. One of the learning event that is capable of influencing the activity of instructional material is by entering into such activity. Instructional materials are designed in full, in the sense that there are elements of the media and an adequate learning resources will affect the atmosphere of learning so that the learning process that occurs on a student be more optimal. With materials designed and equipped the content and illustrations of interest would stimulate students to make use of instructional materials as a learning material or as a source of learning.

Function of instructional material according to National Department Education mentioned in the book of Iif Khoiru Akhmadi that instructional material have many function, such us⁵:

- a. Guidance for teachers who will direct her activities in the learning process, is the substance through the competence that should be taught to students.
- b. Guidance for students who will be directing all of its activity in the learning process, is the substance through the competence that should be learned/master.
- c. The evaluation tool of achievement/mastery learning outcomes.

The existence of instructional materials are necessary, so that the instructional materials are used as guidelines for teachers in the learning process, guidelines for directing students master the subject matter, and also used as a tool to evaluate student achievement against the material being taught.

⁵ Iif Khoiru Ahmadi, Sofan Amri, *Pengembangan & Model Pembelajaran Tematik Integratif*, (Jakarta: Prestasi Pustaka, 2014),,page. 159

For the purpose of making learning materials include:⁶

- a. Provide instructional materials that comply with the demands of the curriculum taking into account the needs of the students, the materials are in accordance with the characteristics and settings or the social environment of students.
- b. To assist students in acquiring alternative instructional materials in addition to the books which happen it is difficult to obtain.
- c. To make easy teachers in carrying out the study.

3. Kinds of Instructional Material

Classification of materials according to the Faculte de Psycologie et Sciences de l'EducationUniversite de Geneve in its website is a slate media, audio visual, interactive and integrated electronics, then referred to as the medienverbund (German which means integrated media) or mendiamix.⁷ A learning materials include:

- a. Lesson learned for students and teachers
- b. Competencies to be achieved
- c. Supporting Information
- d. Exercises
- e. Worksheet (LKS)
- f. Evaluation

⁶ Ibid...

⁷ Abdul Majid, Op.cit., page. 174

Instructional materials can be made from a variety of forms according to the needs and characteristics of the instructional material will be presented. Form of instructional materials are distinguished into four types, such as:

- a. Printed materials (*printed*) are a number of materials prepared in paper, which can serve for the purposes of learning or the delivery of information. For example, handouts, books, student worksheets, module, brochure, leaflet, wall chart, photos/images, model/market.
- b. Listening materials (*audio*) that directly can be played or heard by someone or group of people. For example, radio cassette, vinyl record and compact disk audio.
- c. Materials viewpoint heard of *(audio-visual)* are the all things that can be listened and combined with moving pictures. For example, video compact disks, movies.
- d. Interactive instructional materials is a combination of two or more users are manipulated by the media or given preferential treatment to control a command or the natural behavior of a presentation like a compact disk of material.⁸

4. The Principles of Instructional Materials Election

The existence of some principles that need to be considered in the preparation of instructional materials or learning material. The principles

⁸ Iif Khoiru Ahmadi, Sofan Amri., *op. cit*,. page. 162.

in the selection of instructional materials include principles of relevance, consistency and sufficiency.

- a. The principle of relevance means that connectedness. The instructional materials should be relevant or no connection or relationship with the achievement of basic competencies and competency standards.
- b. The principle of consistency that is consistent. If the basic competency that must be mastered students there are four kinds of instructional materials, then that should be taught must include four kinds.
- c. The principle of adequacy means the material being taught should be quite adequate in helping students master the basic competencies are taught. The material should not be too little, and should not be too much. If too little will be less help reaching the standards of competence and basic competence. Conversely, if too much would be a waste of time and effort that does not need to learn it.⁹

5. Selecting of Instructional Material

Learning materials is an important element of learning which have to attention by the teacher. The subject matter is a medium to achieve the learning objectives "consumed" by the students. Therefore, the determination of the subject must be based on the objectives to be achieved.

⁹ Abdul Ghofur, Disain Intruksional: Langkah Sistematis Penyusunan Pola Dasar Kegiatan Belajar Mengajar (Solo: Tiga Serangkai), page.17

One important factor that affects be success of the overall learning is the ability of teachers to design instructional materials. Instructional material is essentially an integral part of the syllabus, namely planning, predictions and projections on what will be done during the learning activity.

Generally, speaking can be argued that the learning materials (instructional materials) are the knowledge, skills, and attitudes that students must master in order to meet the standard of competence specified. Instructional material occupies a very important position of the overall curriculum, which must be prepared for the implementation of learning to achieve the target. The target must be in accordance with the Core of Competence and Basic Competence to be achieved by students. That is, the material specified for the learning activities should be material that really support the achievement of standards of competence and basic competences, as well as the achievement of indicators.

There are several things that need to be noticed in determining the instructional material including:¹⁰

- a. The subject matter must be appropriate and support the achievement of instructional objectives.
- b. The subject matter should be appropriate to the level of education or development of students in general.

¹⁰ Dian Ramdani, *Pemilihan Materi ajar*

⁽http://dianramadani150393.blogspot.com/2012/12/pemilihan-materi-pelajaran.html, accessed on 30th of March 2015, 09:07 WIB)

c. Establish learning materials must be in harmony with the order destination.

The order of the subject matter should pay attention to continuity (continuity).

- d. The subject matter of the simple stacking to the complex, from the absolute to the difficult, from the concrete towards the abstract. In this way students will easily understand.
- e. The subject matter should include things that are factual and conceptual

6. Excess and Weakness of Printed Instructional Material

As an instructional materials, kinds of instructional materials has many advantages and disadvantages. The excess of printed instructional material is:¹¹

- a. *Availability*. Printed instructional materials are available in a variety of topic and format Flexibility. Printed of instructional materials easily adapted for a variety of purposes and can be used a variety of neighborhood sufficient light.
- b. *Portability*. Printed instructional materials easy to carry from one place to another and do not require a source of electric current
- c. User friendly. Printed of instructional materials easy to use does not require special effort.

¹¹ Rahmat Saripudin, Media dan bahan ajar Cetak

⁽http://rahmatsaripudin.wordpress.com/2008/10/05/media-dan-bahan-ajar-cetak/, diakses tanggal 10 Oktober 2014)

d. Economical. Printed of instructional materials relatively cheaper to produced or purchased and can be reused at any time.

The weakness of printed instructional material, such as:¹²

- a. *Reading level.* One of the problems encountered in the use of instructional materials printed is the level of reading skills of students who are diverse. Some students who are not readers or have barriers in reading experience this problem.
- b. *Prior knowledge*. Instructional materials printed are usually in the form of text book written for the general reader. For readers who have obstacles in initial knowledge/prerequisites will have difficulty in understanding readings.
- c. *Memorization*. Some teachers often ask students to recall many facts and definitions. This practice causes of instructional materials printed as memorization tools.
- d. *Vocabulary*. Some textbooks use terminology a lot of words and concepts that are difficult to understand and the lack of an explanation.
- e. *One-way presentation*. Most instructional materials printed are less interactive so that is passive.

¹² *Ibid*,..

C. Development of Encyclopedia

1. Definition of Encyclopedia

According to the Dictionary Of Indonesian Language (KBBI), Encyclopedia is the universal works that accumulate the various branches of knowledge or a particular science in separate articles and arranged alphabetically.¹³

The word "encyclopedia" is taken from the language of Greece; enkyklios paideia (ἐγκύκλιος παιδεία) means a circle or a complete teaching. The intent is that an encyclopedia of education plenary which includes all science circles. Often the free with dictionaries and encyclopedias free beginning indeed evolved from a dictionary. The main difference between a dictionary and an encyclopedia is that it is a dictionary definition only give each entry or lemma as seen from the linguistic point of view or simply give the words synonym only, while an encyclopedia giving an explanation in greater depth than we were looking for. An encyclopedia article as each tried to explain a phenomenon. Or shorter: dictionary is a list of words that are explained in other words while an encyclopedia is a list of things that sometimes come with images to better explain.¹⁴

An encyclopedia is a collection of explanations of words that describes the information widely, complete, and of course easy for we

toraja.com/humaniora/pendidikan/1154-apa-itu-ensiklopedia, diakses pada 10 Oktober 2014)

¹³ Kabar Toraja, *Definisi Ensiklopedia*, (http://kabar-

¹⁴Definisi Ensiklopedia menurut Wikipedia, (http://id.wikipedia.org/wiki/Ensiklopedia, diakses tanggal 10 Oktober 2014

understand about the science or a particular branch of science that are arranged based on the letters or the alphabet which was later printed into book.¹⁵

An encyclopedia is essentially a development of the dictionary, so that many people judge the same encyclopedia dictionary. In this sense, surely this is the encyclopedia to a dictionary definition of a word that aims to ease the crowds in understanding those words.

2. Kinds of Encyclopedia

Generally, encyclopedia divided into 2 kinds:¹⁶

- a. General Encyclopedia is an encyclopedia which contains in general all disciplines knowledge within. For example, "Britannica Encyclopedia 2010 edition" the contains all the disciplines knowledge and all the important events in the world (from A to Z).
- b. Special Encyclopedia is an encyclopedia that contains the disciplines/specific knowledge or specific areas. For example, "Encyclopedia of Geography", "Encyclopedia of history and culture", "Encyclopedia of Science", "Encyclopedia of Science and Technology", "encyclopedia of Jakarta" (Thematic, chronological or historical).

In this case, the researchers made a special encyclopedia with the theme of living beings and the environment are developed in accordance

¹⁵ Anne Ahira, Pengertian dan Perkembangan Ensiklopedia,

¹⁶ Kabar Toraja,. *Op,.cit,*.

with the theme material 3 to Grade 4 in SDI Kardina Masa Blitar. The material in the encyclopedia covers about humans, animals, and plants.

3. Characteristic of Encyclopedia

Encyclopedia has many characteristic, such as:¹⁷

- a. Any article/ topic, sub topic
- b. The existence of article definition/topic and followed general explanation
- c. The existence of cross reference or further more, see also, running index, etc.
- d. The existence of paragraph, illustrations, images, graphics, table time line.
- e. Compiled and presented systematically alphabetic (A Z), or Thematically,
- f. Historical Chronological
- g. The existence of index
- h. An additional "Faktaneka", that is a Fact of science
- i. The existence of usage instructions (How to Use)

4. Selecting Encyclopedia as an Instructional Science Material

Based on the observation that has been made in last January in 4th class SDI Kardina Masa Blitar with 24 students, that students tended to lack the motivation to learn. It is seen as a learning process of students

¹⁷ Ibid.,

not to pay attention to the teacher and his own chat with friends. In addition, when teachers instruct students to study textbooks, students are not enthusiastic.

Based on this, we can conclude several factors that affect the low student motivation in the classroom, among other books are less attractive, classroom conditions that do not support the learning activities, the way teachers teach less attractive. Factor that encourages students to seek other sources of learning outside the classroom in the form of print and electronic media to replace classroom learning. Therefore, students are trying to learn independently with the help of learning resources in accordance with the wishes of students.

Along with the rapid technological developments, it is necessary that teachers and responsive to the development of this condition, in order to keep learning fun, active, creative, and innovative, but in keeping with the purpose of learning first. Therefore, an important source of self-learning provided an appropriate and attractive, with the hope to increase student motivation and meaningfulness in learning in order to achieve learning objectives well.

Learning of the student must be supported by an interesting learning resources and in accordance with the interests of students. With the development of science and technology is so fast, implies also the availability of a wide range of modern facilities and advanced both print and electronic media that can be used as a learning resource. There has not been little innovation in the manufacture of printed media in the form of encyclopedia especially supportive chemical subjects that can be used as an alternative source of independent learning for students in which there are components required in meaningful learning.

The Encyclopedia is a universal work of collecting the description of the various branches of science or specific disciplines in the articles separately and arranged alphabetically.¹⁸

Development of teaching materials such as encyclopedias material tailored to the content standards and learning materials in class IV, so expect a special encyclopedia of morphology flora and fauna in home environment can help students to learn independently and get the meaningfulness of teaching science. In addition, IPA encyclopedia is also related to the environment, technology and society so as to create "learning joy full". This is what will be considered in the process of learning and development of learning resources such as encyclopedias, because it has advantages in the process of transfer information, so that resources can be more interesting in learning process.

Selection of the encyclopedia as a source of learning due to the encyclopedia is one of the print media that functions as a learning resource for the community. In general, the print media is relatively more popular because of its content in the form of a complete and detailed information, compared to textbooks.

¹⁸ Kabar Toraja,. *Op,.cit,*.

For students who has low intelligence potential (slow mastering lessons) expected with this encyclopedia can be easier to learn and easier to understand the material because it presents the information with images that clarify and can arouse the curiosity that later became the basis for the growth of interest and motivation to learn. Especially for students whose potential intelligence above average (quickly mastered the lesson) is expected to increase the vocabulary knowledge, skills and attitudes that is sufficient to support the stability of the new personality. For example, gain confidence, increase learning experience, both quantitatively and qualitatively according to his ability, and dig deeper interest towards science subjects. In addition, this encyclopedia is expected to help the teacher as one of the sources of reference.

This encyclopedia will be developed based on the 3rd theme of material living creatures and Environment, 1st subtheme Animal and Plant in home environment. Linkages with the environment being peeled further, considering it can improve students' understanding in the study of living things so that students are able to connect it according to his ability.

D. Instructional Science Material

1. Definition of Natural Science

Science is derived from the latin word *scientia* meaning literally that is knowledge. Sund Trowbribge and formulate that science is a collection of knowledge and process. Whereas Kuslan Stone mentions that Science is a collection of knowledge and the means to obtain and make use of that knowledge. Science is a product and a process can not be separated. "Real Science is both product and process, inseparably Joint"¹⁹

According to Abdullah Ali, IPA is "theoretical knowledge obtained or compiled in a manner typical of or specific, i.e. by doing observation, experimentation, theory, drafting false assertion experimentation, observation and so on the way between Habib Dehghani hooks one by way of the other".²⁰

From the opinion expressed above, the nature of science is one of the disciplines knowledge that related to knowing nature systematically. Science is not just a set of knowledge in the form of facts, concepts or principles, but also is a process of discovery of the results of observation/experiment that will continue to be refined.

2. The Essence of Science Learning

Science in a fact built on the basis of scientific products, the scientific process, and the scientific attitude. In addition, science is seen as a process, as a product, and as a procedure (Marsetio Donosepoetro, 1990: 6). As the process refers to all the activities of the scientific knowledge to improve the nature and to discover new knowledge. As the product is defined as a result of the process, in the form of knowledge which is taught in school or outside of school or reading material for the dissemination of

¹⁹ Wikipedia, *Definisi Ilmu Pengetahuan Alam*, (http://id.wikipedia.org/wiki/Ilmu_alam, diakses tanggal 11 oktober 2014)

²⁰ Abdullah Aly & Eny Rahma, *Ilmu Alamiah Dasar*, (Jakarta: Bumi Aksara, 1998), page.12

knowledge. As the procedure in question is a methodology or manner used to know something (research in General) are commonly known as the scientific method.²¹

3. Core Competences of Students 4th grade for Elementary School

Core competence is the translation or operating standards of competence of Graduates in the form of quality which must be owned by the learners who have completed education at certain educational units or specific education level, overview of key competencies grouped into aspects of attitudes, skills and knowledge that must be learned learners to a secondary school, classes and subjects. Core competencies should be balanced between quality describes the achievement of *hard skills* and *soft skills*.

Core competencies serve as an organizing element basic competencies. As an organizing element, the core competence is the binder for vertical and horizontal organization of base competence. Vertical organization of basic competence is the link between the content of basic competence of one class or level of education to grade/ rank on it so it meets the principles of learning that is an on going accumulation occurs between content studied learners. Horizontal organizations is the link between the content of basic competencies one subjects with Basic

²¹Trianto, *Model Pembelajaran Terpadu dalam Teori dan Praktek*, (Jakarta: Prestasi Pustaka,2007), page. 103

Competency content of different subjects in one weekly meeting and the same class so it happens mutually reinforcing processes.

Core competencies are designed in four interrelated groups, namely with regard to religious attitudes (1st core competencies), social attitudes (2nd core competencies), knowledge (3rd core competencies), and application of knowledge (4th core competencies). The fourth group had become a reference of Competency basis and should be developed in any event of integrative learning. Competencies with regard to religious and social attitudes developed indirectly (indirect teaching) that at the time the students learned about knowledge (3rd core competencies) and the application of knowledge (4th core competencies).²²

No.	CORE COMPETENCE
1.	Receiving, running, and appreciate the religious
	teachings that are adhered.
2.	Shows honest behavior, discipline, responsible, polite,
	caring, and confident in interacting with family,
	friends, teachers, and neighbors.
3.	Understand the factual knowledge by way of
	observing and ask yourself based on curiosity about
	himself, God's creation and its activities, and the
	objects that it finds in the home, in schools and
	playgrounds.
4.	Presenting factual knowledge in language that is clear,
	logical, and systematic, the aesthetic work in the
	movement that reflects a healthy child, and the child's
	actions reflect the behavior of faith and morality.

Table 2.1Core Competence for Elementary School

²² Kurikulum2013 Kompetensi dasar sekolah (SD)/ Madrasah Ibtidaiyah (MI) (kementerian pendidikan dan kebudayaan, 2013), page.5

E. Development of Instructional Science Material Based on Encyclopedia

1. Definition of Encyclopedia

According to Big Indonesian Dictionary (KBBI) Encyclopedia, is a universal work that raise the description of the various branches of science or specific disciplines in the articles separately and arranged alphabetically.²³

Encyclopedia is a collection of explanations of words that contains information widely, complete, and certainly easier for us to understand it on a collection of science or a particular branch of science which is based on the letter or alphabet which is then molded into the book.²⁴

Thus, the application of the encyclopedia on the development of instructional materials is very important because it will be very useful in the process of formation of students' concrete thinking pattern.

In providing information, the encyclopedia is easier to understand than other textbooks. This is because the encyclopedia only discuss one topic at a single object, and quite informative discussion. In addition, the arrangement is usually adjusted encyclopedia alphabetically or by a particular grouping, so encyclopedia easier to use. But in its development, encyclopedia require large amounts of information and multimedia skills are pretty good and it's very expensive.

²³ Kabar Toraja, *Definisi Ensiklopedia*, (http://kabar-

toraja.com/humaniora/pendidikan/1154-apa-itu-ensiklopedia, accessed on 10th of October 2014) ²⁴ Anne Ahira, Pengertian dan Perkembangan Ensiklopedia,

⁽http://www.anneahira.com/ensiklopedia.htm, accessed on 10th of October 2014)

For this reason, researchers want to develop an instructional science materials based on encyclopedia as an instructional materials that can make students understand more about the material being taught. This book will be very helpful to understand the functions of the outer shape of animals and plants.

 Characteristics of Instructional Science Materials Development Based on Encyclopedia

In the development of the book The Encyclopedia of Natural Sciences has a character-based as follows, namely:

- a. In the development of instructional science materials based on encyclopedia explain in detail about the functions of the outer shape of the body of animals and plants.
- b. In this book aims in shaping students' mindset that abstract into concrete, because it contains the original pictures that make students into concrete mindset.
- c. In the development of instructional science materials based on encyclopedia of is based grouping animals in environment and parts of plant and their functions clearly and in detail.
- Excess of Development of Instructional Science Material Based on Encyclopedia
 - a. Material to be considered are arranged alphabetically or grouped based on a specific theme.

- b. Instructional materials based on encyclopedia explained clearly on the material and also with the original images.
- c. Instructional materials based on encyclopedia presented with paragraphs, images, and attractive illustrations.
- d. Instructional materials based on encyclopedia also list the sources from which the articles / pictures are taken so that the reader can easily understand the source of these explanations.
- e. The material is presented clearly and in detail.

F. Theory of Development

1. Limitation of Development Research

Definition of research and development by Borg & Gall is a process used to develop and validate educational products²⁵. This study followed the steps in the cycle. Step research or development process consists of the study of the research findings that the products will be developed, developing products based on these findings, conduct field trials in accordance with the setting in which the product will be used, and to revise the results of the field test.

2. Importance and Purpose of Development Research

According to Van den Akker the importance of research and development is based on two reasons, the principal reason for that is derived from the idea that the research approach of "traditional" (research survey, correlation, experimental) research focusing only describe

²⁵ Punaji Setyosari, *Metode Penelitian Pendidikan* (Jakarta: Kencana, 2010), page. 222

knowledge, rarely giving prescriptions that are useful in solving problems design and instructional design or education. Another reason is the existence of a high spirit and complexity of the nature of the education reform policy.

The research purpose was to assess the development of the changes that occur within a certain time. Examples of research on the development of differences in academic and social in a group of children from low-income families and the environment is high. To do this kind of research is usually done through methods such as longitudinal, cross-sectional and *cross sequentional* 26 .

3. Models of Development Research

In the development of instructional materials there are some models that can be used for the development of such research is the model ADDIE, Kemp, Borg & Gall, Dick & Carey model.

a. Model of ADDIE

ADDIE Model is one of the instructional design models that are more generic. ADDIE Model (Analysis-Design-Develop-Implement-Evaluate) emerged in the 1990-an, developed by Reiser and Mollenda. One function of the ADDIE model that guide you in building the infrastructure and training programs are effective, dynamic, and support

²⁶ Ibid, page. 224

the performance of the training itself. These models use the five stages of development as follows:²⁷



Picture 2.1 Steps Design of ADDIE

Steps of ADDIE described as follows

- Analysis. Phase analysis is a process of defining what will be learned by the students, which do need assessment (needs analysis), identify problems (needs) and analyze the form of a task (task analysis). Therefore, the output will be generated in the form of the characteristics or profile of prospective learners, identifying gaps, identifying needs, and detailed task analysis is based on need.
- 2) Design. This phase also known as drafting (blueprint). In the design phase is required formulating SMART (the specific, measurable, applicable, realistic, times) learning goals. Then the teacher devising tests based on learning objectives defined earlier. The teacher

²⁷ Novan Ardi Wiyani, *Desain Pembelajaran Pendidikan*, (Yogyakarta: Ar-Ruzz Media, 2013), page. 42

determines what the appropriate learning strategies to achieve these goals.

- 3) Development. Development is a process for realizing design made into a reality. Means that if in the design required software of a multimedia learning form, so multimedia it should be developed, for example, required the print of module then the modules need to be developed. One important step in this development phase is a trial before being implemented. Test phase is part of one of ADDIE steps, namely evaluation. More precisely evaluation formative because the results are used to improve the learning system to be developed.
- 4) Implementation. Implementation is a concrete step to implement the learning system are made. This means that at this phase all of which have been developed and prepared is according to the role and functions to be implemented.
- 5) Evaluation. Evaluation is the process of learning to see whether the system is being built successfully, in line with expectations or not. In fact initial evaluation phase can be at four phases in the top. Evaluation occurs in every four phases above called formative evaluation due to need revision.
- b. Model Kemp

Instructional design models developed by Kemp is a model that make up the cycle. According to Kemp study consists of various components that are developed appropriate to the needs, goals, and the obstacles that arise in learning. In this design consists of eight stages and each stage is the revision activities. Stages Kemp described as follows:²⁸



Explanation of the Kemp models are:

- 1) Determine the general learning (TIU), trhere are the goals to be achieved in each subject learning materials.
- 2) Make an analysis of the characteristics of learners. This analysis is necessary to know how the educational background, ability, cultural, social, owned by learners as a consideration in the design of learning activities.

²⁸ Ibid, page. 48.

- Determine the specific learning objectives (ICT) in operational and measurable. With the expectation that learners know what to do, learn, and measurable success in learning.
- 4) Determine the material / teaching materials adapted to ICT
- 5) Establish initial assessment to determine the extent to which learners are qualified in the pre-determined learning. Thus, teachers can select, where the material which should be given or learned by the learners.
- 6) Determine the appropriate learning strategy. Selection of this learning strategy should be based on variables such as learning based learning objectives, aspects of learning materials and classroom condition. Moreover, teachers also have to look at the practicality, effectiveness and efficiency of a strategy that allows can be applied in learning.
- Coordinate, which analyzes the existing functional component in learning.
- 8) Conducting evaluation of learning. This activity should be based on objective and materials learning that have been studied by learners.

Each step in the stage is always followed by repair and expected to produce a perfect design.
d. Model Dick & Carey

System model approach Walter Dick and Lou Carey is one of the most influential models. Component once the main steps of learning Dick and Carey, there are 10 stages of instructional design, among others:²⁹



Picture 2.3 Steps Design by Walter Dick & Lou Carey

1) Assess needs to help identify learning goals

Conduct a needs analysis to determine the purpose of the program or product to be developed. This needs analysis activities researchers identified needs immediate priority needs are met. By assessing needs, researcher will be aware of a situation that should exist (what should be) and the real situation in the field of real or actual (what is). By way of "seeing" a gap that occurs, the

²⁹ Ibid, page. 230

development of trying to offer an alternative solution by developing a product or a particular design.

2) Conduct instructional analysis

If the background learning is selected, then the next step development of learning analysis, which includes the skills, processes, procedures, and learning tasks to achieve the learning objectives. Matters whatever the perceived need "felt need" need to be identified and subsequently disclosed in product design to be developed. It became a specification product or design which will be developed further and has its own peculiarities.

3) Analysis of the learner and the context

This analysis can be done simultaneously in conjunction with the analysis of the learning above, or conduct the learning analysis. Analysis of the learner and the context, which includes the ability, attitude and baseline characteristics of learners in the learning setting. And, also including the characteristics of the learning setting in which new knowledge and skills will be used. Step (2) and (3) can be performed either sequentially or simultaneously (simultaneous).

4) Write performance objectives

Formulate performance objectives or performance analyzes performed after learning and context. Formulating objectives of this performance is done by outlining a general purpose into more specific objectives that form the formulation of performance goals, or operational. This picture reflects the operational formulation of special purpose programs or products, procedures developed. This goal is specifically to provide information to develop test items. Researcher perform general purpose or translation of competence existing standards into a more specific operational objectives with specific indicators.

5) Develop assessment instruments

The next step is to develop assessment instruments, which are directly related to the specific objectives, operational (as pointed out in the front). The task of developing this instrument becomes very important. Instruments in this case can be directly related to the operational objectives to be achieved based on certain indicators, and also instruments for a product to measure development design. Instruments relating to special purpose such as achievement test, while the instrument relating to the products or designs that are developed can be either a questionnaire or checklist.

6) Develop instructional strategies

Develop instructional strategies, specifically to help learners achieve specific objectives. Specific learning strategies designed specifically to achieve the objectives stated explicitly by developers. Learning strategies designed is also related to the product or design to be developed. For example, if a developer wants to create a media product image, then what strategy is used to present the image media. If developers want to develop a particular instructional design, what is the appropriate strategy and chosen to support design. So in short, the strategy remains a very important role in the development process that want to be done.

7) Develop and select instructional materials

This step is the actual activities carried out by the developer. Developing and selecting learning materials, which in this case may be: printed materials, manuals both for learners and learning, and other media that are designed to support the achievement of objectives, products or designs that are developed based on the type, kind, and certain models need of giving the argument or reason why did they choose and develop based on the type or model. The reason for choosing the type or model is usually expressed in subpart model of development.

8) Design and conduct formative evaluation

Design and conduct formative evaluation, the evaluation carried out by the developer during the process, procedure, program or product is developed. Or formative evaluation is conducted during the learning process with a view to supporting the process of improving the effectiveness of the process.

Under certain conditions, the developer is quite up to this step. Dick & Carey recommend an evaluative process consists of three steps:

- Testing prototype material individually (one-to-one trying out); individual testing is done to obtain early feedback about a particular product or design. Individual testing is done to the subject of 1-3 people. After doing the individual testing, product or draft is revised.
- Testing of small groups (small group tryout). The test involves a subject that consists of 6-8 subjects. The results of these trials used small groups to revise the product or design.
- Field testing (field tryout). This field testing involving subjects in a larger class involving 15-30 subjects (a whole class of learners).
- During this testing, the developer made some observations and interviews. Thus, developers perform a qualitative approach in addition to quantitative data (test results, the scale of attitudes, rubric and others). The results of the validation of step 8 is then used to make revisions.
- 9) Revise instruction based from formative evaluations

Revisions are made to the process (learning), procedure. Programs, or products associated with the previous steps. Revisions were made to the first seven steps, namely: a general purpose learning, learning analysis, the initial behavior, performance or performance objectives, test items, learning strategies, and / or learning materials.

10) Design and conduct summative evaluation

After a product, program or process development had been developed, the next step is to conduct a summative evaluation. Summative evaluation carried out in order to determine the level of effectiveness of the product, program, or the process as a whole compared to other programs.

c. Model of Borg & Gall

In addition the model above, the model of Borg & Gall outlines the general steps to follow to produce a product, as a cycle of research and development. Steps Borg & Gall described as follows:³⁰



Steps Design by Borg & Gall

Each of the above will be described as follows:

1) Research and data collection

Research and information collecting, which includes a literature review, observation and classroom observation, and preparation of the

³⁰ Punaji Setyosari, op.cit., 237

initial report. First observation or need analysis are very important step, that needs to be done to obtain preliminary information to perform development. It can be done, for example through classroom observation to see the real condition of the field. Literature review and include relevant supporting literature is indispensable as a foundation of the development.

2) Planning

Planning which includes the formulation ability, formulate specific goals to determine the sequence of material, and small-scale trials. It is very urgent in this step is to formulate specific goals to be achieved by the products developed. This objective is intended to provide solid information to develop a program or product, so that tested in accordance with the specific goal to be achieved.

3) Develop primary form of product

Develop primary form of product, or initial draft that includes the preparation of learning materials, handbooks, and evaluation tools. The format of the development of the program in question whether in the form of printed materials, such as modules and teaching materials such as textbooks, sequences or procedures in the design process of the learning system, which is equipped with a video or in the form of a compact disk.

4) Preliminary field

Preliminary field, conducted in the 1-3 school, involving 6-12 subjects and data from interviews, observations and questionnaires are collected and analyzed. The trial is conducted on whether the format of the program developed in accordance with a special purpose. The results of the analysis of these preliminary field be input to revise the initial product.

5) Main product revision

Main product revision, based on the results of preliminary field. The results of field trials are obtained qualitative information about the program or product is developed. Based on these data are still required to do the same evaluation by taking the same sites as well. The products have been revised subsequently held the test.

6) Main field testing

The products have been revised, based on the results of smallscale test, then it be tested again to the unit or try a larger subject. Field trials conducted on 5-15 schools with 30-100 involving the subject. These test is avarege scale categorized. Quantitative data of learning outcomes are collected and analyzed in accordance with the specific goal to be achieved, or if possible, compared with the control group; in order to obtain data for further revision. 7) Operational product revision

Revision products, which is done, based on the results of field test. The results of a field test involving a larger group of subjects is intended to determine the product's success in achieving its objectives and collect information that can be used to improve the program or product needs repair at a later phase.

8) Operational field testing

After revised the product, if the developer wants a product that is more feasible and appropriate, the necessary field tests. This field test involving units or greater subject. This field test could involve 10-20 school or subject to 40-200; and accompanied by interviews, observation, and submission of the questionnaire and then analysis. The results of this analysis then becomes material for the purposes of the next revision of the product, or revision of the final product.

9) Final product revision

Final product revision, revisions based on more extensive field tests. Revision of the final product is be size that the product is actually said to be valid because it has passed a series of tests in stages.

10) Dissemination and implementation

Dissemination and implementation, which present the results of development (processes, procedures, programs or products) to the users and professionals through forums meetings or write in a journal, or in the form of a book or handbook.

This model is a model that will be used in the development of instructional science material based on encyclopedia for students 4th grade at SDI Kardina Masa Blitar.

Borg & Gall model in the development of instructional material systematically provide opportunities for researcher to collaborate with experts in the field of material / content of a field of study, media specialists, instructional design specialists, and other experts related to learning, in order to obtain a result of the development good quality instructional material.

G. Study Material of Morphology Flora and Fauna in Home Environment

1. ANIMALS

A. CHICKEN

- a. Eyes: Eyeball on chicken serves as a visual tool to see the conditions in the surrounding environment.
- b. Cache: Cache serves as a smoothing food and regulate the flow of food into the digestive system with temporary storage.
- c. Beak: The chicken has a short and strong beak shape. The beak shape appropriate to take some kind of grains - grains. Part of this function destroys the seed.

- d. Wings: Wings serves to fly when jumping from a height. Chickens can not fly because of the size of the wing with the body out of balance.
- e. Comb: Hens who are laying show red comb and thickened and soft and warm, hens production showed a thin comb and dry.
- f. Fur: Function quill is to protect the body from injury due to direct friction with hard objects, protecting the body from the effects of ambient temperature, as well as jewelry to attract the opposite sex.
- g. Feet: Chicken legs used to walk and claws on his feet when the soil serves to scavenge for food.
- h. Tail: The main function of the tail on the chicken is as a tool to help balance and as a means of steering the direction of movement.

B. DUCK

- a. Beak: Part duck-shaped blade with serrated base according to forage in a wet, muddy, or in the water like a fish or earthworms.
- b. Eyes: Eyes on the duck serves as the senses of sight, as well as chicken.
- c. Wings: Ducks can fly because its wings are very strong and sustained flapping flight duck requires that require strong wing muscles.
- d. Cache: Cached in ducks smoothing function as a food and regulates the flow of food into the digestive system with temporary storage.
- e. Feet: duck leg function to walk. Duck webbed toes in general because the duck is more like looking for food in water or muddy place and also to swim.

C. COW

- a. Nose: nose / muzzle cow serves as a means of smell and breathing apparatus are used to detect cattle food and surroundings.
- b. Eyes: Eyes on the cow used as the sense of sight. To see the food and objects around as like a human eye.
- c. Mouth: The mouth is an open cavity where the entry of food and water. In the mouth are the teeth and tongue also serves to aid the digestive process with chewing and swallowing.
- d. Ears: Ear is an organ that is able to detect / recognize the voice and also a greater role in balance and body position. In cattle, the ear serves to maintain balance and sound localization.
- e. Feet: Feet in cattle useful to support the weight of cattle so that the cows can walk perfectly using all four legs.
- f. Tail: tail on each animal has a different function. In cattle, the tail serves as a tool to repel flies and other annoying insects.
- **D.** CATS
 - a. Eyes: cat eyes can adjust both for daytime and for evening. In His eyes, oblong oval shape evenings it was open wide in strong light or bright shrink until it becomes the form of a gap.
 - b. Ears: Cats can hear sounds up to 65,000 cycles / second, slightly higher than that found in dogs, and far higher than the human one. The high extraordinary hearing system is this that makes the cat became a great hunter.

- c. Mouth: Mouth useful cat to eat its prey. Cats are considered as carnivorous perfect teeth and digestive tract in particular. The first premolar and molar teeth to form a pair of fangs on each side of the mouth that works effectively as a pair of scissors to tear meat prey.
- d. Mustache: Function is the cat's whiskers as detection systems (scanning) environment. The nerves at the base of whiskers are sensitive enough to detect small movements of air that vibrate mustache.
- e. Feet: Cat walking with her fingertips, not the palms of his feet. At the foot of the cat are claws / nails are formed of a hard protein called keratin to catch and hold prey, even used to scrape the ground and climbing.
- f. Tail: The tail of a cat is a signal change in emotional and psychological cat. Cats also use their tails as a means of balance.

E. BEE

- a. Compound eye and simple: On the head there are two compound eyes and3 oselus (simple eyes) on the top of her head to detect the intensity of lightaround so that they can know when to start and end their activities.
- b. Mouth: The mouth is a mouth sycophants bees and has a long tongue to lick the nectar useful.
- c. Jaw (sungut): Bees also have a pair of lower jaw (mandible) that can be used for various activities such as pinning objects, revoke wood fiber, and even to kill other insects.
- d. Antenna: The other part that is contained in the head of the bee is a pair of antennas are jointed to detect chemical stimuli.

- e. Stomach: Stomach place chemical processing. In addition there is the digestive tract such as the flow of nectar nectar pouch into the stomach and processed into honey.
- f. Sting: Only female bees have a sting at the end of the abdomen. Bees use their sting to paralyze their victims and to defend themselves.
- g. Wings: Wings transparent colored bees, moving in rhythm where if the front wing rises, the rear wing also moved up.
- h. Feet: Feet bee jagged, has a dual function in addition to running and perch on flowers, foot also serves to transport the pollen collected on the flowerhaired bags on two hind legs.

F. SPIDER

- a. Eyes: Spiders have eye clumps consisting of eight eyes are on her back.Each equipped with lenses and eye cells that can capture light beam.
- b. Mouth / chelicerae: At the mouth of the spider, there are poison fangs / chelicerae form a clamp or poison fangs. At chelisera are canines that can move to prey or as a defense tool when danger threatens.
- c. Stomach / abdomen: On the abdomen, a hole expenditures fine threads glands secrete fluids containing elastic protein. The elastic protein hardens in the air to form fine threads that are used to trap prey.
- d. Clamp / pedipalus: Tools for reproduction and capture prey. It also serves as a clamp, tactile, or feet. So that spiders prey using a small leg brace that resembles this.

e. Feet: Spiders have short hair and dense clumps called scapulae situated between the claws functioning absorb moisture and make spider legs as adhesives to walk through a smooth surface such as glass.

G. PIGEON

- a. Eyes: Eye on the dove serves as a visual tool. Bird's eye is protected by a transparent membrane and moving.
- b. Beak: Part short and strong. This serves to peck grains.
- c. Cache: Cache serves as a smoothing food and regulate the flow of food into the digestive system with temporary storage.
- d. Fur: Fur used to fly. Tiny hairs that cover the body of the bird and the tail feathers, symmetrical shape, is used as a rudder in flight. Fur is the result of epidermis useful for isolating body heat to the surroundings.
- e. Wings: Wings serves to fly high in the air, and maintain balance while flying free. Pigeon has a large wing so easy to fly.
- f. Feet: Feet dove-shaped trim function for walking on the ground and perched in the branches of trees.
- g. Tail: The tail and wing serves to maintain altitude, acts as a brake when flying free in the air, and also keep the movement of the turn of birds.

H. RABBIT

a. Long ears: The ears are long to catch the slightest sound that propagates through the air. For that rabbit ears often uphold and move to the right, left, front, back to collect sounds from all directions.

- b. The short neck: Neck in rabbits short indeed. The neck serves to connect between the head and the body of a rabbit.
- c. Fur: Fur rabbit serves as a protective / body warmers.
- d. Eyes: Rabbits have eyes with a wide position, so you can easily see that there is something behind them.
- e. Mouth: In the mouth there are incisors to cut food before the food ingested. Rabbit teeth are very strong so it can chew 160 times every minute.
- f. Feet: The function of the hind legs of rabbits to give a pedestal when jumping and running quickly. While the front legs are shorter to give a pedestal to the body after landing and also dig the soil.
- g. Tail: Rabbit wiggled his tail with the aim to inform his friends that were no danger
- I. MOUSE
 - a. Eyes: Because it is nocturnal, the rat can see a simple form in the dark as far as approximately 10 m. As in rodentia, rodents can not distinguish colors.
 - b. Nose: Rat utilize its sense of smell to detect food or to avoid enemies.
 - c. Mustache: Mustache serves as a highly sensitive touch mice, because the mice do activities at night (nocturnal).
 - d. Mouth: Mouth rats serves to bite food because the mice are rodents. The mouth of mice consisting of upper and lower jaw, there is a growing incisors and powerful, so it can be used as cutting tools or rodents.

- e. Ears: The ears serve as a listening device in mice are sharp and can capture sound with an intensity between 22 KHz-90KHz. Specific sound is a means of communication between them.
- f. Tail: The function of rats is as an organ of balance and to regulate the temperature of body heat because mice do not have sweat glands.
- g. Feet: Feet rats serves to walk, his hind legs to swim are used interchangeably. At the foot of the rat claws are used for climbing and also explore the lands loose to make a hole.
- J. DOG
 - a. EYES: Eye dogs are more sensitive to light and motion than the human eye. Some dogs have a field of view up to 270° while the man only has the field of view of 180° .
 - b. NOSE Muzzle: Dogs have nearly 220 million smell-sensitive cells terhap smell. Information gathering mechanism in the brain dog based particles managed to sniff odors.
 - c. EARS: Dogs can hear the sound of low frequencies from 16 to 20Hz (humans only hear the frequency of 20-70 Hz) and high frequency sound from 70 kHz to 100 kHz. In addition, dogs can move their ears so quickly can determine the exact location of the sound source.
 - d. MOUTH: Mouth to eat and drink. The dog is a carnivorous animal had canine teeth and sharp molars. Large canine teeth, sharp molar teeth also useful for chewing meat and bone.

- e. FEET: Feet back consists of four fingers, but the front foot consisting of five fingers. Dog claws blunt and can not be withdrawn back into the finger.
- f. TAIL: Dog using the tail as a communication medium to convey something (usually the owner).

B. PLANT

1. ROOTS

Root function as part of the cemented plants. If the plants do not have roots, the plants will be easily removed, easy to collapse when the wind or washed away when it rains.

- a. Taproot serves as a place to store water and food. Taproot found in dicotyledonous plants and gymnosperm, for example, is the root of the tree mango, rambutan trees, tree
- b. Root fibers serves to strengthen the crops. This root vegetable found in monocots such as in rice, corn, wheat, etc.

2. FLOWERS

Flowers serves as a breeding tool generative (preceded by fertilization). Flowering plants, fertilization occurs preceded by pollination (the fall of the head of pollen to the stigma).

3. LEAF

Leaf serves as photosynthesis. The leaves contain lots of green dye called chlorophyll. Based the leaf bone shape, the leaves are divided into three types, namely fingers, parallel, and pinnate.

- Bone parallel leaf shaped like parallel lines. Each end of the bone fused leaf. For example in pandan leaves and all kinds of grass.
- b. Fingers leaf bone shaped like a human hand lines. For example in cassava leaves and papaya leaves.
- c. Pinnate leaves bones, bone leaves this type has an arrangement like the fins of a fish. For example in guava leaves and leaf rambutan.

4. ROD

Rod serves as the emergence of leaves, flowers, and fruit. Rod also serves distribute mineral and water are absorbed by the roots, as well as the results of photosynthesis nutrients to all parts of the plant body.

5. FRUITS

Fruit serves to protect seeds. For example mangoes, citrus fruits, apples, etc. The fruit consists of pulp and seeds. The part that we eat are usually flesh.

6. SEEDS

Seeds are the result of fertilization that occurs as a result of pollination between pollen and pistil. If the seed is planted will grow into a new plant. Nothing that seed into pieces one (monocots) and seeds into pieces.

CHAPTER III

RESEARCH METHODS

A. Kind of Research

This research is a type of research and development methods, known as the Research and Development (R & D) oriented products in the field of education. The usefulness is to assist teachers in presenting the teaching material to students. This type of research and development is a type of research that is used to produce a particular product and test the effectiveness of these products.¹ Others opinion, research and development is a process or steps to develop a new product or improve existing products, which can be accounted for.²

The purpose of research in the development of this education is to produce an instructional material that can support learning activities in the classroom. In addition, this development is also expected to solve the problems that occur in the learning process. Thus the development of research is a form of research related to improving the quality of education, in terms of both process and outcomes of education. This product is expected to be a resource that can provide extensive information on the matter and also as a medium of learning that suit the needs of students in understanding living organisms. One way in which the researcher is through development oriented

¹Sugiyono, *Metode Penelitian Pendekatan kuantitatif, Kualitatif, dan R&D*,(Bandung:Alfabeta,2013). Page 298

²Nana Saodih Sukmadinata, *Metode Penelitian Pendidikan* (Bandung:Rosda.2007). page.164.

products such as teaching materials based on encyclopedia with material living creatures to improve the effectiveness of learning for 4th grade SDI Kardina Masa Blitar.

B. Models and Procedures of Development Instructional Science Material

In this research, the researcher develop a product in the form of instructional material using model of instructional development by Borg & Gall covering 10 steps of research and development. Steps Borg & Gall described as follows:³



1) Research and Data Collection

At this first step the researcher collected various data obtained from field observations and literature related to the research. Because the researcher took samples of fourth grade, the researcher will explore a

³ Punaji Setyosari, op.cit., page 237

variety of data to conduct classroom observations. In addition, researcher also conducted interviews to teacher of IV grade. In order to support this study, researcher also collected literature studies and relevant literature to be a cornerstone in developing.

The first step that needs to be done in the model of instructional design is to identify learning objectives, namely to formulate a common goal of learning which will be determined by considering the characteristics of the field of study, student characteristics, and field conditions.⁴ This step determines what the students want to be able to do after participating in learning activities.

While in Curriculum 2013, the term goal of science subjects replaced with competencies required of students after studying science. According Permendikbud No. 64 Year 2013 on the Content Standards for Primary and Secondary Education, Competence Description of science subjects in elementary school are:⁵

- a. Shows the scientific attitude: curiosity, honest, logical, critical, and discipline through the natural science.
- b. Asking the question: what, why, and how of the surrounding nature.
- c. Natural science object observed by using the senses and simple tools.
- d. Record and present the data results in a simple observation of nature around.

⁴ Hamzah B. Uno, *Perencanaan Pembelajaran* (Jakarta: Bumi Aksara, 2006), page. 25

⁵ Permendikbud No. 64 Tahun 2013 tentang Standar Isi Pendidikan Dasar dan Menengah

- e. Reported the observation of nature around verbally and in writing simple.
- f. Describe the concept of science is based on observation.

 Table 3.1

 Core Competence, Mapping of Basic Competence, and Indicator

Core Competence	Mapping of Basic Competence	Indicator
 Receiving, appreciate, and live the teachings of their religion. Have honest behavior, discipline, responsibility, courtesy, caring, and confident in interacting with family, friends, neighbors, and teachers. 	 1.1. To Increase the faith by realizing the relationship regularity and complexity of nature and the universe to the greatness of God who created it, and make it happen in practice the teachings of their religion 1.1 To demonstrate scientific behavior (having curiosity; objective; honest; thorough; careful; diligently; cautious; responsible; open; and caring environment) in the day-to-day activities as a form of implementation of the attitude of doing scientific inquiry and discussion 	
factual of knowledge by observing [hear, see, read] and ask based on curiosity about himself, God's creation and its	3.1 Explain the outer shape of the body of animals and plants and their functions	• Explain the outer shape (morphology) of animal body and its functions after observing the image

activities, and object that met in homes schools, and playgrounds.	ects 4.1 Write down observations about the outer shape (morphology) of the body of animals and	 Distinguish insects and spiders Write down observations about
4. Presenting factual knowledge in lang that is clear, logica and systematic, th aesthetic work in t movement that ref a healthy child, an child's actions refl the behavior of fai and morality.	plants and their guage al, e the flects id the ect ith	form and function

2) Planning

Based on the results of previous research literature study and field needs. Researcher designed a product that will be developed into instructional material that helps teachers in the learning process. With the instructional material, the teacher is able to explain the material of animals and plants in the environment house is to be easy, interesting, and fun. These instructional materials could be used by students independently or guided by the teacher. Because instructional materials designed as attractive and understandable as easy as possible for students.

3) Develop primary form of product

At this stage the researcher prepare an instructional materials, learning evaluation tool, and a handbook. The format of product development can be printed material such as a module or in the form of a compact disk. At this stage the product is still a rough draft, but the components have been developed as complete and perfect as possible. From here, the product will be increased or decreased again according with the results of the initial field trials and validation of experts.

4) Preliminary field

At this stage the researcher examined the development of products in the field. During this test researcher asked the experts to correct its products feasible or not to proceed, in addition, researcher also interviewed teacher of subjects especially for teacher of fourth grade to provide feedback about the products that have been produced. Researcher can conduct discussions with subject teachers, and the results of these discussions will be used to enhance learning products.

5) Main product revision

After conducting initial trials, researcher can improve the product development, such as adding weight material or to add more interesting design in accordance with good advice or input from teacher classroom and expert content and design experts.

6) Main field trial

After revising and obtain a more perfect product can researcher examined the returned product that has been repaired. Testing and refinement at the stage of initial products are still focused on the development and refinement of material products, have not been paying attention in the context of population viability. Feasibility of the population carried out in testing and refinement is at this stage of field trials.⁶

The implementation of field trial is the same in the early stages of trials. The results of these trials are used to restore deficiencies or weaknesses of the product so that it can be a form of instructional material.

7) Operational product revision

In accordance with the results of field trials, researcher were able to improve their products become more perfect. Completion conducted by researcher at this stage is almost the same as the improvement in the early stages, it's just that at this stage the researcher should be more carefully and be more selective in sorting and selecting materials to be added. And at this stage the researcher may ask experts to validate the enhanced product.

8) Operational field trial

Main field testing conducted to access the feasibility of the product at the population level. At this step, test is conducted on a class amount 24 students (4th grade). Test conducted in the classroom. Questionnaires are also given to teacher of 4th grade to make an assessment and give feedback on the products that have been developed.

9) Final product revision

Once tested in the direct field researcher could improve its products back if necessary the addition or improvement. Perfection is done so that

⁶*Ibid*, Page. I78

the product could actually be used in the field and is able to achieve its intended purpose. Results perfection of this product can be regarded as the final product in the process of research and development.

10) Dissimilation and implementation

After doing a perfection, researcher can perform dissimilation and implementation. Dissimilation is spreading the product to be socialized to the whole subject, either through meetings of scientific journals, in collaboration with the publisher if the socialization of a commercial nature, and monitor the distribution and quality control. After dissimilation be done, each school can use the product in their respective places. Because of time is limited, this product only developed in SDI Kardina Massa.

However, because of time constraints and costs faced by researcher, 10 steps of development by Borg & Gall is modivicated by researcher to be 8 steps, which is point number 4 and 5 is deleted.

C. Field Trial

1. Design of Trial Product

Research development would require a series of test on the products. This was done to test the validity of the product, weather actually be beneficial to improving the quality of learning or not. Trial design can be describe in the picture 3.1below:

Picture 3.1



2. Subject of Trial Product

Test subject is a person who involved in the instructional materials trial. Subjects of product assessment development of instructional science materials based on encyclopedia are:

a. Content Expert

Before trial of the students, instructional science materials based on encyclopedia is tested to expert of the material/content. This was done to know the completeness and suitability of the material presented in the instructional materials based on encyclopedia with the content standards set by the government. The content experts are lecturers who are experts in that the subject matter.

The criteria validators of the content expert in this study are stated as follows:

- 1) They have competence in the field of science education of Elementary School.
- They understand about science material at the elementary school especially in the topic simple machine.
- 3) They know the elementary school science curriculum.
- 4) They have attended education up to the level of master degree.
- 5) They have written a book about science or the other.

b. Media/Design Expert

The purpose of the assessment test to the media/design expert is to measure the level of validity and attractiveness of the interactive instructional materials based on encyclopedia from the font shape, colors, and layout of writing to fulfill the criteria for elementary school students.

The criteria validators of the design expert in this study are stated as follows:

- 1) They have competence in the field of designing learning media.
- 2) They have experience in graphic design and designing book or learning media.
- 3) They have attended education up to the level of master degree.
- 4) They have written textbooks and other.
- c. Expert Teacher

After this interactive instructional materials based on encyclopedia have been tested to material expert and media experts, the trial is continued to subject teachers in order to determine the validity of this instructional materials. Science teacher assesses the content of the material in the product and the attractiveness of the product according to the characteristics of elementary school students. The criteria validators of the science teacher in this study are stated as follows:

- 1) An experienced teacher who has taught science at least 5 years.
- 2) Understanding the science materials for elementary school.
- d. Students

Respondents who became the subject of the trial are 4th grade students of SDI Kardina Massa Blitar with a total of 24 students. The selection of SDI Kardina Massa Blitar based on several reasons, those are: (a) students have difficulty in understanding the simple instructional material, (b) the unavailability of instructional media on simple instructional material, (c) this school does not have an instructional science materials to support subjects of Natural Sciences on 3rd theme 1st subtheme.

3. Location of Research

Researcher choose the location in SDI Kardina Massa Blitar on Kalimantan Street No. 111 class IV A, for the reason that the school already be the best school in Blitar city.

4. Type of Data

Based on the data to be used, the data is divided into two types, qualitative and quantitative data. Qualitative data obtained from interviews and advice, both on the stage of the validation testing or main field testing. While quantitative data obtained from the questionnaire.

5. Instrument Data Collection

The collecting data in this study is using several instruments such as questionnaires, achievement test, interview guidelines, and observation guidelines.

The purpose of the data collection instruments are:

1. Questionnaire

Questionnaire is the technique or the way of collecting data indirectly. The questionnaire contains a number of questions to be answered or responded by the respondent.⁷ Questionnaire is used to collect data about the validity and the level of attractiveness of the instructional science materials based on encyclopedia. Form of presentation of the questionnaire such as the table below:

	Table 3.2
Scale	Assessment Questionnaire

Scale Assessment / Feedback				
1	2	3	4	5

Specification:

- a. Score 1 for not easy, not encourage, not attractive, not motivate.
- b. Score 2 for less easy, less encourage, less attractive, less motivate.

⁷ Nana Syaodih Sukmadinata, *Metode Penelitian Pendidikan* {Bandung: Remaja Rosdakarya, 2007}, page. 219

- c. Score 3 for enough easy, enough encourage, enough attractive, enough motivate.
- d. Score 4 for easy, encourage, attractive, motivate.
- e. Score 5 for very easy, very encourage, very attractive, very motivate.
 - 2. Achievement Test

Achievement test is used to determine the achievement of the results students' understanding that is conducted by comparing the results of pre-test and post-test to indicate the effectiveness of student learning after using an instructional science material based on encyclopedia.

3. Interview guidelines

The interview guidelines was made as a guide in conducting interviews with teachers or students to know their responses to interactive instructional materials based on encyclopedia. Interviews were conducted orally in meetings face to face individually.

Interview guide contained questions that include facts, data, knowledge, concepts, opinions, perceptions or evaluations of respondents associated with focusing issues or variables studied in the study.⁸

⁸ Nana Syaodih Sukmadinata, *op.cit.*, page. 216

5. Observation Guidelines

The observation guidelines was made as a guide to determine the process of learning developed by using an interactive teaching material based on offline web developed. Observations are also conducted to determine the initial condition of the school and student characteristics.

6. Analysis Data Technique

a. Qualitative data analysis

Data analysis qualitative used only in the form of qualitative data exposure from experts and respondents in field testing. Sources of qualitative data derived from interviews to the informant and written responses to a questionnaire filled simultaneously. Qualitative data is also used as a guideline for the improvement of product development, a part from the assessment questionnaire.

b. Quantitative data analysis

To determine the percentage level of effectiveness and attractiveness of instructional science material, quantitative data in the form of Likert scale above are analyzed using the following formula:⁹

$$P = \frac{\sum x}{\sum x_i} x \ 100 \ \%$$

⁹ Suharsimi Arikunto, *Dasar-dasar Evaluasi Pendidikan*, (Jakarta: Bina Aksara: 2003), page. 313

Explanation:

P : percentage sought

 Σ_x : the total number of scores answer validator (real value)

 Σ_{xi} : the total number of scores the highest response (expected value)

100: constant number

Of scores that have been in the can further put into the form of assessment qualification criteria as follows:¹⁰

Percentage (%)	Level of Validity	Remarks
84-100	Very valid	Not revised
68-84	Valid	Not revised
52-68	enough valid	Partially revised
36-52	Less valid	Revision
20-36	Very less valid	Revision total

Table 3.3 Advisability Criteria Based on Likert Scale.

Based on the criteria above, instructional materials considered valid if it meets the criteria for a score in the top 68 of all elements that late in student assessment questionnaire.

¹⁰ B. Subali, Idayani dan L. Handayani, "*Pengembangan CD Pembelajaran Lagu Anak untuk menumbuhkan Pemahaman Sains anak Sekolah Dasar*" Jurnal Pendidikan Fisika Indonesia, Number 8, page 26-32, Physic Major State University of Semarang (UNNES), January 2012

Data analysis of test achievement is used to measure the ratio of student learning outcomes. In the field trial, data testing using the design of experiments were carried out by comparing the situation before and after using the product development (before-after).¹¹

Here is an explanation associated with experimental models (beforeafter):

<u> </u>	
U.	
- 1	
)



Picture 3.2 Designs of Experiments (Before-After)

Specification:

- O₁: The value before treatment
- O₂: Value after treatment
- X: Treatment

In the field test results of data collected using questionnaires and learning achievement tests. Field trial data collected using the initial test (pre-test) and final test (post-test) in order to know the comparison of the results students' leaning outcomes before and after using the product. Effect of treatment is (O_2-O_1) .

¹¹ Sugiyono, *Metode PenelitianPendidikan*, (Bandung: Alfabeta, 2013), page. 414
For data processing test results (post-test), data analysis techniques used are:

- Using reference Complete Standard Minimum or SKM (Standar Ketuntasan Minimum) science subjects in SDI Kardina Massa Blitar is ≥75
- 2) Counting the number of students who meet and do not meet the SKM.

$$\mathbf{P} = \frac{\sum x}{\sum x_i} x \ 100 \ \%$$

Specification:

- P : Percentage
- Σx : The total number of students who do not meet the maximum
- Σ_{X1} : The total number of students
- 100 : Number constants

The result of the data analysis calculation of achievement test (posttest) was used to determine the effectiveness of the learning activities using instructional science material based on encyclopedia. Learning activities is effective, if learning using instructional science material based on encyclopedia of students who sufficient the SKM is bigger than the percentage of students who insufficient the SKM, while learning with instructional science material based on encyclopedia will not be effective if the percentage of students who meet the SKM is smaller than the percentage the number of students who do not meet the SKM.

CHAPTER IV

THE RESULT OF RESEARCH AND DEVELOPMENT

A. Result of Research

The research activities have been carried out research with the title "Development of Instructional Science Material Based on Encyclopedia for 4th Grade at SDI Kardina Massa Blitar". Results from this study will present by researcher with complete data and in accordance with the facts on the ground. Interpretation of the data the following results:

1. Pre Research/ Observation

On Monday 29th of December, researcher held a meeting with the headmaster Mr. Khoirul Anam, S.Pd and Mrs. Reni Prasetyawati, S.Pd teacher of 4th grade, to convey the purpose of the research plan. Then researcher provide an overview outline of the implementation of the research. Teacher were advised to carry out research in the fourth grade. From the meeting, the researcher obtained information that the material of morphology of animals and plants on the book in curriculum 2013 are less complete, so that students' difficulties in understanding the material due to the unavailability of teaching resources associated with such materials. It is based on interviews with teacher of 4th grade as follows:

"Materi yang ada pada buku induk kurikulum2013 kurang lengkap sehingga siswa kesulitan dalam memahami materi. Materi tersebut diantaranya pada tema 3 materi Ilmu Pengetahuan Alam tentang morfologi hewan dan tumbuhan di lingkungan rumah. Saya sebagai guru kelas 4 berharap ada sebuah buku yang bisa dijadikan rujukan pada materi tersebut, sehingga saya lebih mudah menyapaikan pada siswa dan siswa juga cepat memahami materi yang disampaikan". Later in the meeting also discussed with the principal investigators and fourth grade teacher about the condition of the class, total students, and the student's background. Based on the data obtained, total students of 4th grade are 24 students with details of 11 male students and 13 female students. Appropriate class conditions in general, the ability of students is very heterogeneous.

Researcher asked when researcher could begin research product trials. In this study, researcher act as the implementing measures in the learning morphology of animals and plants around the house according to the book that will be developed on the 3rd theme. Researcher said that in this study the teacher will be observer who observes the activities of researcher and students for conducting research, therefore, Researcher asked the teacher from fourth grade to become observer in this study. The researcher also explained that the observer on duty to observe all the activities of researcher and students if it is in accordance with the plans that have been prepared using observation sheet prepared by the researcher.

After holding a meeting with the principal and teacher of the fourth grade, researcher got research schedule in the fourth grade in August, researcher also set up a product that was developed to be trial in class IV.

On 8th of August 2015, researcher looked carefully about the condition and situation of the fourth grade students who will serve as research subjects. On this occasion the researcher introduce her self to the fourth grade students accompanied by a teacher of fourth grade, and

explains that the researcher will teach in the classroom because researcher want to conduct trials products that have been developed. And all students are expected to participate actively in the learning that researcher do during carrying out research in the fourth grade.

At that time, researcher conduct product trials using small classes, the researcher explained the matter clearly and in detail. Researcher using group discussion learning methods in the learning process. During the lesson, students were active and enthusiastic in listening to the material until the meeting is over and the researcher asked students to complete a questionnaire assessment has been provided. Some students' response to the book and the material presented is:

"Bu... materi yang disampaikan dalam buku ini jelas dan bagus, karena ada gambarnya".
"Aku suka cara belajarnya, banyak kuis dan soal-soal yang bisa menambah pengetahuan".
"Bu... saya juga pengen bisa bikin buku seperti Bu Guru".

After trial a small class is finished, the next meeting is a trial product on a large classroom with 24 students. To recognize the students' initial knowledge about the material morphology of animals and plants, then at that time the researcher also held about the pre-test to be done individually. Of the matter is no correct answer and one of the students because the thinking ability of students is heterogeneous.



Picture 4.1: Condition of *Pre-test*

From pre-test questions can be analyzed and viewed the ability of learners of the material that will be conducted by researcher, and supported by information from fourth grade teacher about the ability of learners.

PRE-TEST	d. untuk mencari makanan/ cacing di tempat becek, berlumpur, dan berair
NAMA . NILAI KELAS . NO. ABSEN .	3. Berapakah jumlah kaki laba-laba? a. 4 b. 6 c. 8
ilihlah satu jawaban yang paling benar!	d. 10
Mengapa ayam memiliki bentuk paruh yang pendek dan kuat? a. karena ayam memakan daging b. karena ayam memakan daging c. karena ayam memakan buah-buahan d. karena ayam memakan buah-buahan d. karena ayam termasuk hewan pemakan biji-bijian Apa fungsi paruh yang berbentuk seperti sudu dengan pangkal bergerigi pada bebek? a. untuk menakan biji-bijian b. untuk menghaluskan makanan	 4. Ekor tiktis bertiungsi sebragai a. alat gerak b. alat komunikasi c. alat pendeteksi mangsa d. alat keseimbangan dan pengatur suhu tubuh 5. Apa fungsi sayap pada ayam? a. untuk terbang di udara b. untuk melindungi tubuhnya c. untuk memikat lawan jenisnya d. untuk terbang saat melompat dari suatu ketinggian
	 Hungsi gigi seri pada kelinci adalah

Picture 4.2 Questions of *Pre-test*

B. Development of Instructional Science Material Based on Encyclopedia

Morphology of Flora and Fauna in Home Environment

Development of instructional materials have been made by this developer in the form of printed instructional science materials on the subject *Morphology of Flora and Fauna in Home Environment* on the third theme for class IV SD / MI.

Instructional material is produced in this development contains four parts, namely the pre-introduction, introduction, content part and supporting part. Here are the explain of each part.

1. Pra-Introductory

Pre-introductory section contains the components prior to start learning.

a. Cover

The front page (cover) consists of the title of the book "Morphology of Flora and Fauna in Home Environment", for elementary/ MI Class IV. The picture on the cover in accordance with the materials developed as well as the author's name.



Picture 4.3

b. Preface

Preface is an explanation of the constituent general description contents of instructional materials, constituent expectations for instructional materials, thanks to all those who helped the development of instructional material and demand criticism and suggestions from writer to all readers for improvement of teaching materials.

KATA PENGANTAR	
Dunia hewan dan tumbuhan selalu menarik bagi anak anak. Beoim	
banyak binatano dan tumbuhan di sekitar rumah kita. Kespekarasaman isnis	
hauran dan tumbuhan di sakitar tautu saia mambuat anak namasaran dan	
annakin inain tahu tantana kabidunan hannan dan tumbuhan tanakut	
Pasa jugin tahu wanda akau tanbati danan adawa kular referensi	
Ana ingin tata mereka akut teropat dengan adanya pidat reteretar	
tentang dunia newan dan tumpunan yang tentunya dukemas kinusus untuk	
anak-anak Sayangnya, penum panyak referensi sedernana tentang	
ensiklopedia sederhana tentang mortologi hewan dan tumbuhan di sekitar	
rumah. Sebagian besar buku yang ada justru dikhususkan bagi orang dewasa	
sehingga anak-anak merasa kesulitan untuk memahami bahasa yang	
dipaparkan dalam buku.	
Penulis menghadirkan buku ini di hadapan anda, buku ajar berbasis	
ensiklopedia sederhana yang mengungkap tentang fungsi bagian huar tubuh	
hewan dan tumbuhan di sekitar rumah dengan gambar menarik, bahasa yang	
singkat dan sederhana sehingga mudah dipahami oleh anak-anak. Namun	
demikian, penulis mengharap kritik dan saran dari pembaca untuk	
memperbaiki buku ensiklopedia ini.	
Untuk Xelas 14/50/941	

c. Standard of Competence and Indicator

Standard of competence and indicator contains details standard competence and indicator that must be mastered by the student.



d. Concept Maps

Concept map in instructional materials, contains a summary of the simple instructional material presented in the form of a chart that aim to help students understand the lesson.



Picture 4.6

e. Procedure Utility

This procedure is to make easy the reader about the content material of encyclopedia. So, the reader easy to understand how to use this book.

PEDOMAN PENGGUNAAN	
Managed Participation and a second se	Mengipk sinn belgir newnia genior.
And	Image: contract of the contra
	Unal Quin IV 30/10 Contraction

f. Table of contents

Table of contents on instructional material contains component title of the whole section contained in its pages and its instructional materials to help students find the material to be studied.



2. Part of Introduction

This section is to provide information about definition of morphology (flora and fauna). This section to make easy the reader about the meaning of morphology.

PENGERTIAN MORFOLOGI HEWAN DAN MORFOLOGI TUMBUHAN dan d tark ix ix Picture 4.9

3. Part of Content

1) Front Material of Title

This section contain global explanation about the flora or fauna.



2) Material

This section contains materials of morphology. Learning presented in this instructional material by picture with short explanation of function the outer shape of flora and fauna.



3) Great News

This section contain about the unique news related to the material.



Web resources bellow can be found by students to increase many information related with the material.

Germ birs men	eari sendiri info_info tentang fungsi tubuh kucing di situs web berikut:
 http://w 	ahw33d.blogspot.com/2010/06/jenis_jenis_mata_hewan_sensai_
dengan	html
 http://w 	awashahab.blogspot.com/2012/05/kacing_memiliki_pendengaran_
yang_sa	ungstihtml
 http://w 	ww.kashus.co.id/thread/5246c1fca3cb17510b000004/fungri_kumis_
pada_tu	louh_lexcing)
 http://ci 	patimat.blogspot.com/2007/03/casiklopedi_kacing.html
 http://w 	www.nibuutut.com/apa_acbenarnya_fungui_ekor_pada_kueing
	Datal Value IV OD AVI

5) Quiz

Quiz to review of what student have learned. This quiz consist of various types of questions, such as matching, mind mapping, multiple choice, filling answer. Questions have been formed in such a way so as to stimulate students to observe and think beyond the book.



6) Practicum

Practicum contains simple experiment activities which are supported by pictures and practical guidance to facilitate the activities of the experiment. This activity serves to support the students' understanding in the topic and will develop the skill of experimentation.



Picture 4.15

7) Glossary

Glossary provides difficult words related to the material being studied and is equipped with an explanation. This glossary is useful to give an explanation when readers find difficult words in the interactive teaching material.

		GLOSARIUM	
	Dorsal	: Punggung	
	Gigi Molar	: Gigi untuk menghasluskan makanan	
	Gigi premolar	: Gigi untuk merobek makanan	
	Kosmopolit	: Organisme yang dapat hidup dan berkembang di berbagai	
	penjuru dunia		
	Nares anteriores	: Lubang hidung pada ayam	
	Ovotestis	: Organ pembentuk sel telur manjadi satu dengan organ	
	pembentuk sel spo		
	Panting	: Anjing terengah_engah sambil menjulurkan lidah	
	Rostrum	: Faruh	
	Tapetum lucidum	: : Lapisan tisu pada mata kebanyakan binatang vertebrata	
	·		
U U 📗	_	Untal Kolas IV SD/MI	
		Picture 4.16	

- 4. Section Complementary
 - 1) Evaluation contains exercises to be undertaken students. The matter relating to the material on learning. Problem is structured so that students are easier to remember the material has been delivered.



2) Bibliography is a list of books or other sources used by the authors as a reference teaching materials manufacture located at the end of the teaching material.



C. Validity of Instructional Science Material Based on Encyclopedia Morphology of Flora and Fauna in Home Environment

Data from the validation of instructional science materials based on encyclopedia began on 12th of June and ended on 14th of August 2015, by collecting data through the results of the validation experts and field trials.

Data validation of instructional science material is obtained from the results of the evaluation conducted by the validator, such as expert of validation content/material, expert of validator design/media, and validator science teachers who teach in SDI Kardina Massa Blitar.

The data obtained is quantitative data and qualitative data. Quantitative data derived from assessment questionnaire with Likert scale, while the qualitative data is in the form of criticism and suggestions validator. To questionnaires validator experts and students scoring criteria scores are as follows:

Percentage (%)	Level of Validity	Remarks
84-100	Very valid	Not revised
68-84	Valid	Not revised
52-68	enough valid	Partially revised
36-52	Less valid	Revision
20-36	Very less valid	Revision total

Table 4.1Qualification Validity Level Based on Percentage

Table 4.2
Criteria for scoring Questionnaire Validation Expert, Theacer of Study and
Students

Score				
1	2	3	4	5
Not appropriate	Less appropriate	Quite appropriate	Appropriate	Very appropriate

This is presentation of data and data analysis assessment by the content expert, design expert and teachers fourth grade and their criticism and advice.

1. Result Validation of Expert Content

a. Quantitative Data

Quantitative data on the results of content expert can be seen in table 4.3.

	Table 4.3		
Results validation of c	ontent expert Instruction	onal science materials	based on
	encyclopedia		

No	Statement	x	xi	P (%)	the level of validity	Explanation
1	What about the relevant level of development of instructional science material based on encyclopedia with KI and KD?	4	5	80	Valid	Not Revision
2	How suitability pictures with the material presented?	3	5	60	Quite Valid	Minor revision
3	Is the learning content in instructional science material based on encyclopedia accordance with science material in Curriculum 2013?	4	5	80	valid	Not revision
4	How systematic description of learning content in development of instructional science material	3	5	60	Quite Valid	Minor revision

	based on encyclopedia?					
5	How the scope of the material with the theme presented in the development of instructional science material based on encyclopedia?	3	5	60	Quite Valid	Minor revision
6	How does the level of language difficulty used in accordance with the level of student understanding?	4	5	80	valid	Not revision
7	Is the material presented through the development of instructional science material based on encyclopedia can provide motivation to the students to study harder?	4	5	80	valid	Not revision
8	Is the evaluation instrument used to measure the ability of students?	4	5	80	valid	Not revision
9	How is the material suitability with existing material?	4	5	6 80	valid	Not revision
10	Does the formulation of indicators presented in the instructional science material based on encyclopedia in accordance with the basic competencies specified in the curriculum in 2013?	4	5	80	valid	Not revision
	Analysis	40	50	80%	Valid	Not Revision

$$\mathbf{P} = \frac{\sum x}{\sum x_i} x \ 100 \ \%$$

P : percentage sought

 $\sum x$: the total number of scores answer validator (real score)

 $\sum x_1$: the highest total number of scores answer validator (real score)

100 : constant number

$$\mathbf{P} \quad : \frac{\sum x}{\sum xi} \ge 100$$

P :
$$\frac{40}{50} \times 100$$

= 80 %

Based on the calculation above, the assessment conducted by the content experts is summed up 80%. If it matches the validity criteria table, then the score included in criteria is valid, but the validator ask to revise again because there are some components still quite valid in some components of the questionnaire, it is necessary to do revision and the revision will be submitted to the content expert for being tested again about its validity.

b. Qualitative Data

Qualitative data on the results of expert material can be seen in table 4.4

Name	Criticism and Suggestion
Ahmad Abtokhi, M.Pd	• The glossary put in end of book before references
	• The question is for concept understanding
	• Mapping concept for improve the ability students in learning

		Τa	able 4.4	. / .		
Suggestio	n Expert	Content	of Instr	uctional	Science	Material

The results of the validation of instructional science material after revision can be seen in Table 4.5

Table 4.5

The first revision results of validation expert content against Instructional science material based on encyclopedia

No	Statement	x	x_i	P (%)	the level of validity	Explanation
1	What about the relevant level of development of instructional science material based on encyclopedia with KI and KD?	4	5	80	Valid	Not Revision
2	How suitability pictures with the material presented?	3	5	60	Quite Valid	Minor Revised
3	Is the learning content in instructional science material based on encyclopedia accordance with science material in Curriculum 2013?	4	5	80	Valid	Not Revision
4	How systematic description of learning content in development of instructional science material based on encyclopedia?	4	5	80	Valid	Not revision
5	How the scope of the material with the theme presented in the development of instructional science material based on encyclopedia?	4	5	80	Valid	Not revision
6	How does the level of language difficulty used in accordance with the level of student understanding?	5	5	100	Very valid	Not revision
7	Is the material presented through the development of instructional science material based on encyclopedia can provide motivation to the students to study harder?	5	5	100	Very valid	Not revision
8	Is the evaluation instrument used to measure the ability of students?	5	5	100	Very valid	Not revision
9	How is the material suitability with existing material?	5	5	100	Very valid	Not revision

10	Does the formulation of indicators presented in the instructional science material based on encyclopedia in accordance with the basic competencies specified in the curriculum in 2013?	5	5	100	Very valid	Not revision
	Analysis	44	50	88 %	Very Valid	Not Revision

$$\mathbf{P} = \frac{\sum x}{\sum x_i} x \ 100 \ \%$$

Р

Σx

 $\sum x_1$

- : percentage sought
- : the total number of scores answer validator (real score)
 - : the highest total number of scores answer validator (real score)
- 100 : constant number

$$\mathbf{P} \quad : \frac{\sum x}{\sum xi} \ge 100$$

P :
$$\frac{44}{50} \times 100$$

Based on the calculation above, the assessment conducted by materials/contents experts is summed up 88%. If it matches with the validity criteria table, then the score is included in the criteria valid.

All components are getting valid, but validator asks to revise it back for further improvements in order to develop more attractive products, and in accordance with the characteristics of students' age level in elementary school. After revision, the result of the revision will be submitted to contents expert to test its validity. c. Qualitative Data

Qualitative data on the results of expert material can be seen in table 4.6

Name	Criticism and Suggestion
Ahmad Abtokhi, M.Pd	 Every pictures of outer shape from flora/fauna should to be clear by choosing picture related with the outer shape. So, it can show part of body which mean. The question lead to understanding the concept

Table 4.6Suggestion Content Expert of Instructional Science Material

The results validity of the content experts after the second revisions

are presented in table 4.7

Table 4.7 The Second Revision Results of Validation Expert Content against of Instructional science materials based on encyclopedia

No	Statement	x	x _i	P (%)	the level of validity	Explanation
1	What about the relevant level of development of instructional science material based on encyclopedia with KI and KD?	5	5	100	Very valid	Not revision
2	How suitability pictures with the material presented?	5	5	100	Very valid	Not revision
3	Is the learning content in instructional science material based on encyclopedia accordance with science material in Curriculum 2013?	4	5	80	Valid	Not Revision
4	How systematic description of learning content in development of instructional science material based on encyclopedia?	5	5	80	Valid	Not revision

5	How the scope of the material with the theme presented in the development of instructional science material based on encyclopedia?	5	5	80	Valid	Not revision
6	How does the level of language difficulty used in accordance with the level of student understanding?	5	5	100	Very valid	Not revision
7	Is the material presented through the development of instructional science material based on encyclopedia can provide motivation to the students to study harder?	5	5	100	Very valid	Not revision
8	Is the evaluation instrument used to measure the ability of students?	5	5	100	Very valid	Not revision
9	How is the material suitability with existing material?	5	5	100	Very valid	Not revision
10	Does the formulation of indicators presented in the instructional science material based on encyclopedia in accordance with the basic competencies specified in the curriculum in 2013?	5	5	100	Very valid	Not revision
	Analysis	49	50	98 %	Very Valid	Not Revision

$$\mathbf{P} = \frac{\sum x}{\sum x_i} x \ 100 \ \%$$

P : percentage sought

 $\sum x$: the total number of scores answer validator (real score)

 $\sum x_1$: the highest total number of scores answer validator (real score)

100 : constant number

$$\mathbf{P} \quad : \frac{\sum x}{\sum xi} \ge 100$$

P
$$:\frac{49}{50} \ge 100$$

= 98 %

The assessment response of material or content expert to the interactive teaching materials is very valid criteria with the percentage of validity score 98%

d. Qualitative Data

Qualitative data on the results of expert material can be seen in table 4.8

Table 4.8Suggestion Content Expert of Instructional Science Material

Name	Criticism and Suggestion
Ahmad Abtokhi, M.Pd	• For the next, I hope you can make
	book like this more complete.

e. Product Revision

Based on analysis performed, revision of instructional science material development will be seen on table 4.9

 Table 4.9

 Revision of Instructional Science Material Based on Content Expert





2. Results Validation of Design Expert

a. Quantitative Data

Quantitative data on the results of design expert can be seen in table 4.10

Table 4.10
Results of First Validation Design Expert of Instructional Science
Material based on Encyclopedia

No	Questionairre	x	x_i	P (%)	the level of validity	Explanation
1	How does the attractiveness of packaging design cover of instructional science material	4	5	80	valid	Not revision

	based on encyclopedia?					
2	How conformity with the image on the cover of instructional science material based on encyclopedia?	4	5	80	Valid	Not revision
3	How conformity with the selection of the chapter title in the chapter opening images of instructional science material based on encyclopedia?	4	5	80	valid	Not revision
4	How to design a concept map on instructional science material based on encyclopedia?	3	5	60	Quite Valid	Minor revision
5	Is the typeface used in accordance with the fourth grade students of SD / MI?	4	5	80	valid	Not revision
6	How layout typing on instructional science material based on encyclopedia?	3	5	60	Quite Valid	Minor revision
7	How suitability font size used by students of class IV SD / MI?	4	5	80	valid	Not revision
8	How the image placement accuracy on any material of instructional science material based on encyclopedia?	4	5	80	Valid	Not revision
9	Are the images is an interesting on instructional science materials for students to learn?	6 ₄	5	80	Valid	Not revision
10	How the use of space and typing the title material?	3	5	60	Quite valid	Minor revision
	Analysis	40	50	80%	Valid	Not revision

 $\mathbf{P} = \frac{\sum x}{\sum x_i} x \ \mathbf{100} \ \%$

P : percentage sought

 $\sum x$: the total number of scores answer validator (real score)

100 : constant number

P :
$$\frac{\sum x}{\sum xi} x \ 100$$

P : $\frac{40}{50} x \ 100$

= 80%

Based on the calculation above, the assessment conducted by the design experts is summed up 80%. If it matches the validity criteria table, then the score included in criteria is valid, but the validator ask to revise again because there are some components still quite valid values in some components of questionnaire, it is necessary to do revision and the revision will be submitted to the design expert for being tested again about its validity.

b. Qualitative Data

Qualitative data on the results of design expert can be seen in table 4.11

Name	Criticism and suggestions
Nurul Yaqien, M.Pd	 Color of cover should to be clear and deep Matching color Should to use the easy font. Because it can make the students difficult to read Footer shouldn't to be thick Preface, title shouldn't to use

Table 4.11	
Suggestions Design Expert of Instructional S	cience Materials

	•	background Should to use white background on the text explanation
--	---	---

The results validity of design experts after the revisions are presented in table 4.12

Table 4.12

Results of Second Validation from Design Expert of Instructional Science Material based on Encyclopedia

No	Questionairre	X	x _i	P (%)	the level of validity	Explanation
1	How does the attractiveness of packaging design cover of instructional science material based on encyclopedia?	4	5	80	valid	Not revision
2	How conformity with the image on the cover of instructional science material based on encyclopedia?	5	5	100	Very Valid	Not revision
3	How conformity with the selection of the chapter title in the chapter opening images of instructional science material based on encyclopedia?	4	5	80	valid	Not revision
4	How to design a concept map on instructional science material based on encyclopedia?	4	5	80	Valid	Not revision
5	Is the typeface used in accordance with the fourth grade students of SD / MI?	4	5	80	valid	Not revision
6	How layout typing on instructional science material based on encyclopedia?	5	5	100	Very Valid	Not revision
7	How suitability font size used by students of class IV SD / MI?	5	5	100	Very Valid	Not revision
8	How the image placement	5	5	100	Very Valid	Not revision

	accuracy on any material of instructional science material based on encyclopedia?					
9	Are the images is an interesting on instructional science materials for students to learn?	5	5	100	Very Valid	Not revision
10	How the use of space and typing the title material?	4	5	80	valid	Notrevision
	Analysis	45	50	90%	Very Valid	Not revision

$$\mathbf{P} = \frac{\sum x}{\sum x_i} x \ 100 \ \%$$

P : percentage sought

 $\sum x$: the total number of scores answer validator (real score)

 $\sum x_1$: the highest total number of scores answer validator (real score)

$$\mathbf{P} \quad : \frac{\sum x}{\sum xi} \ge 100$$

P :
$$\frac{45}{50} \times 100$$

= 90%

Based on the calculation above, the observations made by experts overall design reaches 90% if matched with the eligibility criteria table, then the score is included in the very valid criteria.

c. Qualitative Data

Qualitative data on the results of design expert can be seen in table 4.13

 Table 4.13

 Suggestions Design Expert of Instructional Science Materials

Name	Criticism and suggestions
Nurul Yaqien, M.Pd	• The cover should making better

d. Product Revision

Based on the analysis performed, the revision of the book and media are as

table 4.14

Tabel 4.14Revision of Teaching Material Based on Design Expert

No.	Point	Before revision	After revision
1.	Color of cover should to be clear and deep. And also there is logo of university behind cover		
2.	Should to use the easy font. Every title without background	<image/> <image/> <image/> <image/> <image/> <image/> <image/> <image/> <image/>	<section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header>



3. Results Validation of Expert Learning

a. Quantitative data

Quantitative data on the results of the validation thematic subject

teachers can be seen in table 4.15

Table 4.15

Results Validation of Expert Learning Instructional Science Materials Based on Encyclopedia

No	Questionairre	x	x _i	P (%)	the level of validity	Explanation
1	What about the relevant level of development of instructional science material based on encyclopedia with KI and KD?	5	5	100	Very valid	Not revision
2	How suitability pictures with the material presented?	5	5	100	Very valid	Not revision
3	Is the learning content in instructional science material based on encyclopedia accordance with science material in Curriculum 2013?	4	5	80	valid	Not revision
4	How systematic description of learning content in development of instructional science material based on encyclopedia?	4	5	80	valid	Not revision
5	How the scope of the material with the theme presented in the development of instructional science material based on encyclopedia?	4	5	80	valid	Not revision
6	How does the level of language difficulty used in accordance with the level of student understanding?	4	5	80	valid	Not revision
7	Is the material presented through the development of instructional science material based on encyclopedia can provide motivation to the students to study harder?	5	5	100	Very valid	Not revision

8	Is the evaluation instrument used to measure the ability of students?	5	5	100	Very valid	Not revision
9	How is the material suitability with existing material?	5	5	100	Very valid	Not revision
10	Does the formulation of indicators presented in the instructional science material based on encyclopedia in accordance with the basic competencies specified in the curriculum in 2013?	5	5	100	Very Valid	Not Revision
Analysis		46	50	92%	Very Valid	Not Revision

$$\mathbf{P} = \frac{\sum x}{\sum x_i} x \ 100 \ \%$$

Р

: percentage sought

 $\sum x$: the total number of scores answer validator (real score)

 $\sum x_1$: the highest total number of scores answer validator (real score)

$$\mathbf{P} \quad : \frac{\sum x}{\sum xi} \ge 100$$

P :
$$\frac{46}{50}$$
 x 100

= 92 %

Based on the above calculation, the observations made by the teacher experts reach 92%, if matched with the eligibility criteria table, then the score is included in the very valid criteria.

b. Qualitative Data

Qualitative data on the results of expert material can be seen in table 4.16

Table 4.16 Criticism and Suggestion Expert Learning of Instructional Science Material

Name	Criticism and Suggestion							
Reni Prasetyawati, S.Pd	• The resulting product is good							
	and can motivate students in							
	learning.							
	• The author should to							
	complete/add the animal in							
	home environment.							

c. Product Revision

From the results of expert assessment from teacher learning, then this product does not need revision. There are little criticisms and suggestions that the kinds of animal in home environment should to be added. Criticisms and suggestions of science teachers can be used to enhance the product in order to become better.

D. Field Trial Results

1. Result of small scale test

Small scale test of this stage is testing about attractiveness. The small-scale test is conducted to 12 student of 4th grade at SDI Kardina Massa Blitar. 12 students is choosen from a student criteria that have the different score that the developer get from the teacher, they are 4 student with high achievement, 4 student medium achievement and 4 student with low achievement. Exposure data from the results of the assessment can be seen in table 4.17

Table 4.17
Result Assessment of Small Scale Test Based on Instructional Science Materials Based on Encyclopedia Morphology of Flora and
Fauna in Home Environment Student 4 th Grade at SDI Kardina Massa Blitar

Questions	X ₁	X ₂	X ₃	X 4	X 5	X ₆	X ₇	X ₈	X9	X10	X ₁₁	X ₁₂	$\sum x$	$\sum x_i$	P (%)
1	4	4	4	4	4	4	5	5	4	5	4	5	52	60	86.7
2	5	5	5	5	5	5	5	5	<u> </u>	5	5	5	60	60	100
3	5	5	4	5	5	5 5	5	5	4	5	5	5	58	60	96.7
4	5	5	5	5	5	5	5	75	4	5	5	5	59	60	98.3
5	4	4	4	5	5	5	5	5	5	5	5	5	57	60	95
6	5	4	4	5	4	5	5	5	4	5	5	5	56	60	93.3
7	5	5	5	5	5	5	5	5	5	5	5	5	60	60	100
8	4	5	5	5	5	5	5	5	5	5	5	5	59	60	98.3
9	4	5	5	5	4	5	5	5	4	5	5	5	57	60	95
10	5	4	4	5	5	5	5	5	5 _	5	5	5	58	60	96.7
Total	46	46	45	49	47	49	50	50	45	50	49	50	576	600	96

Explanation:
$$P = \frac{\sum x}{\sum x_i} x \ 100 \ \%$$

- P = Percentage $\sum x$ = Total number of student's answer
- $\sum x_i$ = Highest number of answers at the level of validity
- = Respondent 1-12 is the students of SDI Kardina Massa Blitar X₁₋₂₁

Explanation:

- 1. Instructional science material based on encyclopedia can facilitate learning.
- 2. Attractiveness of the existing image on instructional materials.
- 3. Compliance with picture material on instructional materials.
- 4. Compliance type face and font size on instructional materials.
- 5. The material on instructional materials easy to understand.
- 6. Compliance practice questions with the content of the materials on instructional materials.
- 7. The language used in instructional materials easy to understand.
- 8. Attractiveness of instructional materials to be studied.
- 9. Instructional materials can increase the motivation to learn.
- 10. The use of instructional science material based on encyclopedia can give encouragement in learning.

Respondents:

- 1. Ahmad Raza Fahri
- 2. Bintang Kuncoro
- 3. Gita Ayu Putri
- 4. Haidar el Fawwaz
- 5. Huga K. Akbar
- 6. M. Galby Zidan
- 7. Lolyta Khilmi
- 8. Nadine Raissa zobar
- 9. Nathannael. R
- 10. Nazwa adellia
- 11. Rangga Putra Hariyanto
- 12. Vania Sherra Ridinaya

Here is the percentage level of achievement of the attractiveness of the material

by using the questionnaire:

 $P = \frac{\sum x}{\sum x_i} x \ 100 \ \%$ Р : Percentage $\sum x$: Total number of student's answer $\sum x_i$: Highest number of answers at the level of validity X₁₋₁₂ : Respondent 1-12 is the students of SDI Kardina Massa Blitar 100 : constant number $:\frac{\sum x}{\sum xi} \ge 100$ Р $:\frac{576}{600} \ge 100$ Р = 96%

Based on the calculations above it can be concluded that the assessment questionnaire based on field small scale-tests class IV SDI Kardina Massa reach 96 %. If matched with the eligibility criteria table, then the score is included in the criteria is attractive. It can be concluded that instructional science material that has been developed is interesting to learn.

2. Field Trial

a. Attractiveness

Field trial of this stage is trial about attractiveness of instructional science materials based on encyclopedia obtained from the

score that has been filled by the object of study, namely 4th grade SDI Kardina Massa Blitar, amounting to 24 students. Exposure data

from the results of the assessment are as follows:

Result of Assessment of Field Trial against Instructional Science Materials Based on Encyclopedia Morphology of Flora and Fauna in Home Environment Student 4th Grade at SDI Kardina Massa Blitar

Table 4.18

Quest	X1	x ₂	X3	X4	X5	X6	X7	Xs	Xø	X10	x 11	X 12	X 13	X 14	X15	X16	X17	X18	X19	X20	X 21	X 22	X23	X24	$\sum x$	$\sum x_i$	P (%)
1	5	4	5	5	4	4	4	4	5	4	5	5	5	5	4	5	- 5	5	4	5	5	-5	5	5	112	120	93.3
2	-5	4	5	- 5	- 5	- 5	- 5	4	- 5	- 5	4	5	5	5	5	- 5	- 5	- 5	4	- 5	- 5	- 5	- 5	-5	116	120	96.7
3	5	4	5	4	5	5	5	4	- 5	5	5	5	5	- 57	3	5	- 5	- 5	5	5	5	5	5	5	115	120	95.8
4	4	4	5	- 5	- 5	- 5	- 5	5	- 5	- 5	5	-5	5	5	4	- 5	- 5	- 5	4	- 5	- 5	- 5	- 5	- 5	116	120	96.7
5	5	4	5	5	5	5	4	4	- 5	4	5	5	5	5	4	5	- 5	- 5	5	5	5	5	5	5	115	120	95.8
6	- 5	4	5	4	- 5	-5	- 5	5	- 5	15	5/	5	5	5	3	- 5	5	5	4	- 5	-5	- 5	- 5	-5	115	120	95.8
7	5	5	5	3	5	- 5	- 5	- 5	- 5	4	- 5	5	5	5	5	5	5	- 5	4	5	4	-5	-5	-5	115	120	95.8
8	-5	- 5	5	- 5	- 5	- 5	- 5	- 5	4	5	4	-5	-5	-5	3	5	- 5	5	- 5	- 5	-5	- 5	- 5	-5	116	120	96.7
9	5	5	5	3	5	- 5	- 5	4	5	5	5	- 5	- 5	-5	5	4	- 5	5	- 5	5	5	- 5	-5	5	116	120	96.7
10	4	- 5	5.	- 5	- 5	4	- 5	4	4	4	5	5	5	_ 5 ⊂	3	° 5	5	5	4	5	-5	- 5	-5	-5	112	120	93.3
Total	48	44	50	44	49	48	48	44	48	46	48	50	50	50	39	49	50	50	44	50	49	50	50	50	1.148	1200	956.6

Explanation:

$\mathbf{P} = \frac{\sum x}{\sum x_i} x \ 100 \ \%$	

- P = Percentage
- $\sum x_i$ = Highest number of answers at the level of validity
- $\sum x$ = Total number of student's answer x₁₋₂₁ = Respondent 1-12 is the students of SDI Kardina Massa Blitar

Explanation:

- 1. Instructional science material based on encyclopedia can facilitate learning.
- 2. Attractiveness of the existing image on instructional materials.
- 3. Compliance with picture material on instructional materials.
- 4. Compliance type face and font size on instructional materials.
- 5. The material on instructional materials easy to understand.
- 6. Compliance practice questions with the content of the materials on instructional materials.
- 7. The language used in instructional materials easy to understand.
- 8. Attractiveness of instructional materials to be studied.
- 9. Instructional materials can increase the motivation to learn.
- 10. The use of instructional science material based on encyclopedia can give encouragement in learning.

Respondents:

- 1. Aurelia Ramadika
- 2. Bintang Kuncoro
- 3. Eril Faday
- 4. Fahreza Rafli
- 5. Florisita Zaskia M.
- 6. Galby Zidane
- 7. Ghaitsa Zahira Shofa
- 8. Gita Ayu Putri Intan

- 9. Haidar el Vawwaz
- 10. Huga
- 11. Icha Amanda
- 12. Jelita Puspa Dewi Anggraeni
- 13. Lionie Ayu Anindhita
- 14. Lolyta Khilmi. Z
- 15. M. Abi Yustadza
- 16. M. Rayhan Akmal
- 17. Maulla Ananda. R
- 18.. Nadine Raissa Zahar
- 19. Nathannael R.
- 20. Nazwa Adellia Nur Ramadhenis
- 21. Rafi FirmanW.P
- 22. Rangga Putra Hariyanto
- 23. Salwa Maulida
- 24. Vania Sherra Ridinaya

$\mathbf{P} = \frac{\sum x}{\sum x_i} x \ 100 \ \%$

- P : Percentage
- $\sum x$: Total number of student's answer
- $\sum x_i$: Highest number of answers at the level of validity
- X₁₋₁₂ : Respondent 1-12 is the students of SDI Kardina Massa Blitar
- 100 : constant number

$$\mathbf{P} \qquad : \frac{\sum x}{\sum xi} \ge 100$$

P
$$:\frac{1.148}{1.200} \times 100$$

= 95.6%

Based on the questionnaire assessment of product trials conducted in class IV above, the overall results reached 95.6%. If it matches the validity criteria table, then the score is included in the criteria are very valid.

b. Effectiveness

To know the difference and the progress of student understanding, through tests are conducted in the form of pre-test and post-test. Pre-test and post-test are conducted on students in class IV SDI Kardina Massa Blitar.

The results of the assessment of data pre-test and post-test obtained from field trials of products can be seen in the following table:

No.	Name	Pre-Test	Post-Test (X)	Complete (X ₁)	Incomplete
1.	Aurelia Ramadika	70	100	N	
2.	Bintang Kuncoro	70	94	V	
3.	Eril Faday	76	100		
4.	Fahreza Rafli	64	64		
5.	Florisita Zaskia M.	58	88		
6.	Galby Zidane	58	58		
7.	Ghaitsa Zahira Shofa	70	94		
8.	Gita Ayu Putri Intan	70	94		
9.	Haidar el Vawwas	54	94		

Table 4.19Results Assessment of the Field Trial in Pre-test and Post-test

	P (%)	RPUS		91.7 %	8.3%
	Average	68.6	91.8	-	-
	Total	1.646	2.202	22	2
24.	Vania Sherra Ridinaya	76	100	V	
23.	Salwa Maulida	70	88	V	
22.	Rangga Putra	70	/100 ()	V	
21.	Rafi Firman	58	88		
20.	Nazwa Adellia Nur Ramadhenis	76	100	V	
19.	Nathannael R.	76	94	\checkmark	
18	Nadine Raissa Zahar	88	100	V	
17.	Maulla Ananda R.	58	94	V	
16.	M. Rayhan Akmal	76	82	V	
15.	M. Abi Yustadza	70	94	\checkmark	
14.	Lolyta Khilmi Z.	82	100	\checkmark	
13.	Lionie Ayu Anindhita	52	100	\checkmark	
12.	Jelita Puspa	64	100	\checkmark	
11.	Icha Amanda	70	88	\checkmark	
10.	Huga	70	88	\checkmark	

$$\mathbf{P} = \frac{\sum x}{\sum x_i} x \ \mathbf{100} \ \%$$

P : Percentage

- $\sum x$: Total number of student's who insufficient the SKM
- $\sum x_i$: Total number of students
- 100 : constant number

Complete Standard Minimum of natural science from thematic is \geq 75. From the data table above explains that the students after learned using the product of instructional science material implemented by researcher, students who sufficient the standard minimum there are 22 students with percentage of **91.7%**, while students who insufficient the standard minimum there are 2 students with percentage of **8.3%**. With the results of students' learning achievement, the results of field trials can be concluded that this product has positive influence, effectively and efficiently used in learning activities.



CHAPTER V

DISCUSSION

A. Analysis Product Development of Instructional Science Materials Based on Encyclopedia

The potential have found in SDI Kardina Massa Blitar is the adequate facilities and proper infrastructure. In addition, there are some problems related to the learning process. Problems found in this research is the unavailability of instructional science materials used by students to support learning processes that make students interest and also improve students in learning achievement. So that, the researcher will develop an instructional science material based on encyclopedia to support in learning process.

According to Big Indonesian Dictionary (KBBI) Encyclopedia, is a universal work that raise the description of the various branches of science or specific disciplines in the articles separately and arranged alphabetically.¹

Product development is based on the fact that the unavailability of supporting instructional science materials. Thus, the results of product development aims to meet the availability of instructional science materials based on the curriculum in 2013 which more specific in subjects of Natural Sciences which is expected to increase the effectiveness and attractiveness of student in learning at the elementary school level.

¹ Wikipedia, *Definisi Ensiklopedia*, (http://wikipedia.com/humaniora/pendidikan/1154-definisi-ensiklopedia, accessed on 10th of October 2014)

Procedure development of instructional materials according Borg and Gall is ten step, but researcher explains four development steps including:²

- 1. Step of pre-development by conducting a needs assessment and curriculum analysis.
- 2. Step of development by conducting the preparation of instructional materials.
- 3. Step of trials conducting by validator expert and teachers class IV.
- 4. Step of revision products to enhance instructional materials. If the product valid, instructional materials already do not need to do a revision and the product is ready to be implemented.

Product development of teaching materials has been carried out by an assessment of expert materials, design experts, teachers and students of class IV SDI Kardina Massa Blitar as users of the development product. Aspects assessed in doing revision includes the elements of the feasibility of the components, the accuracy of the content, effectiveness and attractiveness of learning. The results of the responses of the experts would be a material improvement of product development prior to field trial.

Function of instructional material according to National Department Education mentioned in the book of Iif Khoiru Akhmadi that instructional material have many function, such us³:

² Borg, walter R, *Educational Research an Introduction*, (Longman: The Book Press, 1979), page. 624

³Iif Khoiru Ahmadi, Sofan Amri, Pengembangan & Model Pembelajaran Tematik Integratif, (Jakarta: Prestasi Pustaka, 2014),page. 159

- 1. Guidance for teachers who will direct her activities in the learning process, is the substance through the competence that should be taught to students.
- 2. Guidance for students who will be directing all of its activity in the learning process, is the substance through the competence that should be learned/master.
- 3. The evaluation tool of achievement/mastery learning outcomes.

Results development of instructional materials in the form of textbooks students with subject of *Morphologi Fauna and Flora in Home Environment* class IV. Development of this instructional materials based on encyclopedia specific in science lesson on curriculum 2013 are intended to help students understanding deeply.

Excess of Instructional Science Material Based on Encyclopedia are:⁴

- 1. Material to be considered are arranged alphabetically or grouped based on a specific theme.
- 2. Instructional materials based on encyclopedia explained clearly on the material and also with the original images.
- 3. Instructional materials based on encyclopedia presented with paragraphs, images, and attractive illustrations.
- 4. Instructional materials based on encyclopedia also list the sources from which the articles / pictures are taken so that the reader can easily understand the source of these explanations.

⁴ Rahmat Saripudin, *Media dan bahan ajar Cetak Berbasis Ensiklopedia* (http://rahmatsaripudin.wordpress.com/2008/10/05/media-dan-bahan-ajar-cetak/, diakses tanggal 10 Oktober 2014)

5. The material is presented clearly and in detail.

Development of instructional science materials based on encyclopedia has good descriptions according to the characteristics of elementary school students. Cover of the instructional science materials based on encyclopedia contains the identity of the product. Front page contains preface, competencies and indicator, concept maps, user guide, table contents. The main page contains the learning materials with big pictures of outer shape, quiz, practicum, evaluation exercises, and glossary which helps learning process and learning achievement.

B. Analysis The Results of Validation Expert of Development Instructional Science Materials

Development of this product has passed the process of analysis from three experts that material/content expert, instructional media experts/ design expert and science learning experts. Validation was conducted to assess the products that have been developed, and then it was analyzed by quantitative data in the form of total score on the questionnaire and qualitative data in the form of suggestions, criticisms, comments and responses from the some experts.

The results of the validation of materials experts has achieved very valid criteria with a total percentage of **98%**. Validity of instructional media design experts reached very valid criteria with a total percentage of **90%**. The

results of the validation learning experts with teachers class IV at SDI Kardina Massa Blitar achieved very valid criteria on the percentage of **92%**.

This means, the products being developed is feasible to be tested because of instructional science materials based on encyclopedia is in accordance with the validation some experts and the design is also in accordance with the character of student in elementary school level.

C. Analysis of Field Trial

1. Result of Small Scale Trial

The revised product design can be directly trial, after being validated and revised. The trial in early stages can be simulated on a the limited group. Testing was conducted to obtain information on whether a new product to function effectively and efficiently when compared with older products.⁵

The first activity in this small scale trials of this product is introduction between the researcher/developer with the students, then the researcher asks to the students about learning activities in the classroom especially for Natural Science, and what they have ever used the facilities to support in learning process

Core activity in this product experiment that the researcher ask help the teacher to choose 12 students who will conduct in small scale trials. They are 4 students in high achievement, 4 students in medium

⁵ Sugiyono, *Metode PenelitianPendidikan*, (Bandung: Alfabeta, 2013), page. 302

achievement, and 4 students in low achievement. Then the students are invited to learn the products that have been developed.

Based on the observations, the students are very enthusiastic and spirit in understanding the material. They are also spirit working on the quiz that exist in that instructional material. This is indicated by the response of students in the completed questionnaires to assess the attractiveness levels achieve very valid criteria with the total percentage of **96%**. It's mean the product don't require of revision.

2. Result of Field Trial

After the successful trial of the product, and there may be a revision that is not too important, then the next new product is applied in real conditions for a wide scope.⁶ In the operation of the new product, it remains to be assessed deficiencies or obstacles that arise in order for further improvements.

a. Attractiveness

Questionnaire is the technique or the way of collecting data indirectly. The questionnaire contains a number of questions to be answered or responded by the respondent.⁷ Questionnaire is used to collect data about the validity and the level of attractiveness of the instructional science materials based on encyclopedia.

⁶ Sugiyono, *Metode PenelitianPendidikan*, (Bandung: Alfabeta, 2013), page. 310

⁷Nana Syaodih Sukmadinata, *Metode Penelitian Pendidikan* (Bandung: Remaja Rosdakarya, 2007), page. 219

Based on the questionnaire assessment of product trials conducted in class IV at SDI Kardina Massa Blitar, the overall results reached **95.6%**.

Implementation of instructional science materials based on encyclopedia for the 4th grade students in SDI Kardina Massa Blitar is very easy and attractive. This product is a new media that students can read the book by their self to support/ complete material deeply about morphology flora and fauna in home environment. Even though it's need guidance from the teacher to use this instructional material.

b. Effectiveness

Achievement test is used to determine the achievement of the results students' understanding that is conducted by comparing the results of pre-test and post-test to indicate the effectiveness of learning outcomes.⁸

Implementation of the pre-test which was held on 10 of August 2015 and post-test was held on 13 of August 2015 in class IV A at SDI Kardina Massa Blitar. The results of the *pre-test* and *post-test* for the 4th grade students on field trials can be presented in the following table 5.1:

⁸ Nana Syaodih Sukmadinata, *op.cit.*, page. 216

No.	Name	Pre-Test	Post-Test (X)	Complete (X ₁)	Incomplete
1.	Aurelia Ramadika	70	100		
2.	Bintang Kuncoro	70	94		
3.	Eril Faday	76	100		
4.	Fahreza Rafli	64	64		
5.	Florisita Zaskia M.	58	88		
6.	Galby Zidane	58	58		
7.	Ghaitsa Zahira Shofa	70	94		
8.	Gita Ayu Putri Intan	70	94		
9.	Haidar el Vawwas	54	94		
10.	Huga	70	88	\checkmark	
11.	Icha Amanda	70	88		
12.	Jelita Puspa	64	100	$\langle \rangle $	
13.	Lionie Ayu Anindhita	52	100	V	
14.	Lolyta Khilmi Z. 💦 📂	82	100	\checkmark	
15.	M. Abi Yustadza	70	94		
16.	M. Rayhan Akmal	76	82		
17.	Maulla Ana <mark>n</mark> da R.	58	∕ 94 V		
18	Nadine Raissa Zahar	88	100		
19.	Nathannael R.	76	94		
20.	Nazwa Adellia Nur	76	100	\checkmark	
	Ramadhenis				
21.	Rafi Firman	58	88	\checkmark	
22.	Rangga Putra	70	100		
23.	Salwa Maulida	70	88		
24.	Vania Sherra Ridinaya	76	100	N	
	Total	1.646	2.202	22	2
	Average	68.6	91.8	-	-
	P (%)	-	-	91.7 %	8.3%

Table 5.1Results of research on Field Trial using *Pre-Test* and *Post-Test*

Specification:

- P : Percentage
- $\sum x$: Total number of student's who insufficient the standard minimum
- $\sum x_i$: Total number of students
- 100 : constant number

Data analysis of test achievement is used to measure the ratio of student learning outcomes. In the field trial, data testing using the design of experiments were carried out by comparing the situation before and after using the product development (before-after).⁹

In the field test results of data collected using the initial test (pretest) and final test (post-test) in order to know the comparison of the results students' leaning outcomes before and after using the product.

Complete Standard Minimum of natural science is \geq 75. From the data table above explains that the students after learned using the product of instructional science material implemented by researcher, students who sufficient the complete standard minimum there are 22 students with percentage of **91.7%**, while students who insufficient the complete standard minimum there are 2 students with percentage of **8.3%**. With the results of students' learning achievement, the results of field trials can be concluded that this product has positive influence, effectively and efficiently used in learning activities.

⁹ Sugiyono, Metode PenelitianPendidikan, (Bandung: Alfabeta, 2013), page. 414

CHAPTER VI

CONCLUSION

A. Conclusion of Development

Development process and the results of the assessment of instructional science materials for the 4th grade students of elementary school stated as follows:

- 1. This development has produced the product in the form of text book with the title *Morphology Flora and Fauna in Home Environment*. Development of instructional science materials based on encyclopedia has high validity score. The value of the attractiveness product based on the assessment some experts and the response of the trials subject were stated as follows:
 - a) The assessment response of material or content expert to instructional science material based on encyclopedia is very valid criteria with the percentage of validity score 98%
 - b) The assessment results of design expert to instructional science material based on encyclopedia is very good the percentage of validity reaches 90%
 - c) The assessment response of learning expert from teacher class IV at SDI Kardina Massa to instructional science material based on encyclopedia is very good with the percentage of the attractiveness reaches 92%

- 2. The results of field trial
 - a. The attractiveness from development of instructional science material based on encyclopedia have an attractiveness of the assessment responses from the 4th grade students at SDI Kardina Massa Blitar is very good with the percentage of the attractiveness reaches 95.6%.
 - b. The effectiveness of instructional science material based on field trial to learning achievement of students measure using *post-test*. The result of test as follows:
 - The average value of learning achievement in post-test reached 91.8% compared to pre-test average value reached 68.6%. It indicated that there was increasing in the students' learning achievement before and after using the product of instructional science material based on encyclopedia.
 - After using this product, the students' values that sufficient the SKM is 22 students with the percentage reached 91.7%, while the students' values who insufficient the SKM is 2 students with the percentage reached 8.3%.

Thus, the results of the development of instructional science material based on encyclopedia material morphology of flora and fauna in home environment have a good quality. It's mean, instructional science material can enhance the effectiveness of learning and the attractiveness of this product. Thus, it can provide the positive influence in improving students' learning achievement.

B. Suggestion

The suggestions will present related to the development of this product is divided into two parts, such as suggestions of product utilization and suggestions of further product development.

1. Suggestions of Product Utilization

- This instructional science material have been trial with any stages. And the results this product effectiveness to learning process.
- This instructional material can be utilized by teachers to support the material especially for science according with characteristic students of elementary school.
- 2. Suggestions of Further Product Development
 - Development of instructional science material based on encyclopedia is the product of this development. This product is limited to support science material in 3rd theme 1st sub-theme about morphology of flora and fauna in home environment. Therefore, need for further development with other themes or many kinds of flora and fauna with the appropriate approach.

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(kementerian pendidikan dan kebudayaan)

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APPENDIXS



1st Appendix : Research Licence



KEMENTERIAN AGAMA UNIVERSITAS ISLAM NEGERI MAULANA MALIK IBRAHIM MALANG FAKULTAS ILMU TARBIYAH DAN KEGURUAN JalanGajayana 50, Telepon (0341) 552398 Faximile (0341) 552398 Malang http://tarbiyah.uin-malang.ac.id. email :psg_uinmalang@ymail.com

01 April 2015

Nomor Sifat Lampiran Hal

: Penting : -: Izin Penelitian

8

: Un.3.1/TL.00.1/693/2015

Kepada

Yth. Kepala SDI Kardina Masa Blitar

di

Blitar

Assalamu'alaikumWr. Wb.

Dengan hormat, dalam rangka menyelesaikan tugas akhir berupa penyusunan skripsi mahasiswa Fakultas Ilmu Tarbiyah dan Keguruan (FITK) Universitas Islam Negeri Maulana Malik Ibrahim Malang, kami mohon dengan hormat agar mahasiswa berikut:

Nama :	Akmala Mutoharoh
NIM :	11140066
Jurusan :	Pendidikan Guru Madrasah Ibtidaiyah (PGMI)
Semester – Tahun Akademik :	Genap - 2014/2015
Judul Skripsi	Development of Instructional Science Material
	Based on Encyclopedia for 4th Grade at SDI
	Kardina Masa Blitar

diberi izin untuk melakukan penelitian di lembaga/instansi yang menjadi wewenang Bapak/Ibu.

Demikian, atas perkenan dan kerjasama Bapak/Ibu yang baik disampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.



Tembusan : 1. Yth. Ketua Jurusan PGMI 2. Arsip



2nd Appendix : Research Certificate



YAYASAN PEMBINA LEMBAGA PENDIDIKAN PERGURUAN TINGGI PGRI BLITAR SEKOLAH DASAR ISLAM (SDI) KARDINA MASSA

Alamat : Jl. Kalimantan No. 111 Telp. (0342) 808912 Sananwetan KOTA BLITAR

SURAT KETERANGAN Nomor: 301/422.VI.e/SDI-KM/VIII/2015

Yang bertanda tangan di bawah ini:

Nama	: KHAIRUL ANAM, S.Pd
Jabatan	: Kepala Sekolah
NIP	KS ISI A
Unit Kerja	: SD Islam Kardina Massa Kota Blitar

Menyatakan bahwa :

Nama	: AKMALA MUTOHAROH
NIM	: 11140066
Jurusan	: Pendidikan Guru Madrasah Ibtida'iyah (PGMI)
Instansi	: Universitas Islam Negri Maulana Malik Ibrahim Malang

Telah mengadakan penelitian di SDI Kardina Massa Kota Blitar, tertanggal 8 – 14 Agustus 2015 sebagai kebutuhan skripsi dengan judul "Pengembangan Bahan Ajar IPA Berbasis Ensiklopedia Morfologi Hewan dan Tumbuhan di Lingkungan Sekolah untuk Kelas IV di SDI Kardina Massa Blitar.

Demikian Surat Keterangan ini dibuat untuk digunakan sebaik - baiknya.

Blitar, 15 Agustus 2015 Kepala SDI Kardina Massa Kota Blitar NAM, S.Pd

3rd Appendix : Evidence of Consultation



EVIDENCE CONSULTANT TEACHING EDUCATION OF ISLAMIC ELEMENTARY SCHOOL TARBIYAH AND TEACHING TRAINING FACULTY

Name	: A
NIM	: 1
Tittle	: I
	E

- : Akmala Mutoharoh : 11140124
- e : Development of Instructional Science Material Based on Encyclopedia for 4th Grade at SDI Kardina Massa Blitar : Dr. H. Nur Ali, M.Pd

Advisor

No.	Date	Material Consultant	Signature
1.	23 rd of March 2015	Outline	1.
2.	25 th of March 2015	Revision Outline & Chapter I	2.
3.	21 st of May 2015	Chapter I & II	3.
4.	25 th of May 2015	Revision Chapter III	4.
5.	25 th of August 2015	Chapter III	5.
6.	10 th of September 2015	Revision Chapter III	6.
7.	19 th of September 2015	Chapter I-IV	7.
8.	1 st of October 2015	Chapter V & VI	8.
9.	8 th of October 2015	Chapter V	9.
10.	15 th of October 2015	Grammar	10.
11.	3 rd of November 2015	All Chapter	11.

Malang, 3 November 2015

Mengetahui Ketua Jurusan Pendidikan Guru Madrasah Ibtida'iyah

Dr. Muhammad Walid, MA NIP. 197308232000031002

4th Appendix : Validator Identity

No.	Name	Position	Evaluators
1.	Ahmad Abtokhi, M.Pd	Science Lecturer of	Content Expert of
		Physics at the Faculty of	Instructional
		Science and Technology	Science Material
		UIN MALIKI MALANG	based on
			Encyclopedia
2.	Nurul Yaqin, M.Pd	Secretary of Management	Expert Design and
		of Islamic Education	Learning Media of
	5	MALIK	Instructional
	45.84	BAK	Science Material
			based on
		日本語品	Encyclopedia
3.	Reni Prasetyawati, S.Pd	Teacher of 4 th grade at SDI	Learning Expert of
		Kardina Massa Blitar	Instructional
			Science Material
	/ •		based on
	20	States and the second s	Encyclopedia

Identity of Validator Subjects

5th Appendix : Student Identity

No.	Name	Explanations
1.	Aurelia Ramadika	4 th Grade at SDI Kardina Massa Blitar
2.	Bintang Kuncoro	4 th Grade at SDI Kardina Massa Blitar
3.	Eril Faday	4 th Grade at SDI Kardina Massa Blitar
4.	Fahreza Rafli	4 th Grade at SDI Kardina Massa Blitar
5.	Florisita Zaskia M.	4 th Grade at SDI Kardina Massa Blitar
6.	Galby Zidane	4 th Grade at SDI Kardina Massa Blitar
7.	Ghaitsa Zahira Shofa	4 th Grade at SDI Kardina Massa Blitar
8.	Gita Ayu Putri Intan	4 th Grade at SDI Kardina Massa Blitar
9.	Haidar el Vawwaz	4 th Grade at SDI Kardina Massa Blitar
10.	Huga	4 th Grade at SDI Kardina Massa Blitar
11.	Icha Amanda	4 th Grade at SDI Kardina Massa Blitar
12.	Jelita Puspa Dewi	4 th Grade at SDI Kardina Massa Blitar
	Anggraeni	
13.	Lionie Ayu Anindhita	4 th Grade at SDI Kardina Massa Blitar
14.	Lolyta Khilmi. Z	4 th Grade at SDI Kardina Massa Blitar
15.	M. Abi Yustadza	4 th Grade at SDI Kardina Massa Blitar
16.	M. Rayhan Akmal	4 th Grade at SDI Kardina Massa Blitar
17.	Maulla Ananda. R	4 th Grade at SDI Kardina Massa Blitar
18	Nadine Raissa Zahar	4 th Grade at SDI Kardina Massa Blitar
19.	Nathannael R.	4 th Grade at SDI Kardina Massa Blitar
20.	Nazwa Adellia Nur	4 th Grade at SDI Kardina Massa Blitar
	Ramadhenis	DRUSTA
21.	Rafi FirmanW.P	4 th Grade at SDI Kardina Massa Blitar
22.	Rangga Putra Hariyanto	4 th Grade at SDI Kardina Massa Blitar
23.	Salwa Maulida	4 th Grade at SDI Kardina Massa Blitar
24.	Vania Sherra Ridinaya	4 th Grade at SDI Kardina Massa Blitar

Identity of Subject Field Trial

6rd Appendix : Instrument Validation of Instructional Science Material by Expert Material

No	Ougstionsing	Score				
	Questionante	1	2	3	4	5
1	What about the relevant level of development of instructional science material based on encyclopedia with KI and KD?					
2	How suitability pictures with the material presented?					
3	Is the learning content in instructional science material based on encyclopedia accordance with science material in Curriculum 2013?	M V				
4	How systematic description of learning content in development of instructional science material based on encyclopedia?	PHIN	GEF			
5	How the scope of the material with the theme presented in the development of instructional science material based on encyclopedia?		21			
6	How does the level of language difficulty used in accordance with the level of student understanding?					
7	Is the material presented through the development of instructional science material based on encyclopedia can provide motivation to the students to study harder?	XAL				
8	Is the evaluation instrument used to measure the ability of students?					
9	How is the material suitability with existing material?					
10	Does the formulation of indicators presented in the instructional science material based on encyclopedia in accordance with the basic competencies specified in the curriculum in 2013?					

7th Appendix : Instrument Validation of Instructional Science Material by Design Expert

No	Questionairre	Score			Score			
	Questionante	1	2	3	4	4 5		
1	How does the attractiveness of packaging design cover of instructional science material based on encyclopedia?							
2	How conformity with the image on the cover of instructional science material based on encyclopedia?							
3	How conformity with the selection of the chapter title in the chapter opening images of instructional science material based on encyclopedia?	1 V						
4	How to design a concept map on instructional science material based on encyclopedia?	PHIN N	GEF					
5	Is the typeface used in accordance with the fourth grade students of SD / MI?		18					
6	How layout typing on instructional science material based on encyclopedia?							
7	How suitability font size used by students of class IV SD / MI?)						
8	How the image placement accuracy on any material of instructional science material based on encyclopedia?	NAY ST						
9	Are the images is an interesting on instructional science materials for students to learn?							
10	How the use of space and typing the title material?							

8th Appendix : Instrument Validation of Instructional Science Material by Expert Learning

No	Critorio	Score				
	Criteria	1	2	3	4	5
1.	What about the relevant level of					
	development of instructional science					
	material based on encyclopedia with					
	KI and KD?					
2.	How suitability pictures with the					
	material presented?					
3.	Is the learning content in instructional					
	science material based on encyclopedia					
	accordance with science material in					
	Curriculum 2013?	1				
4.	How systematic description of learning	11				
	content in development of instructional	0.1				
	science inaterial based on	2				
5	How the scope of the material with the	7	6			
5.	theme presented in the development of	1 3				
	instructional science material based on	2	アス			
	encyclopedia?					
6.	How does the level of language					
	difficulty used in accordance with the					
	level of student understanding?					
7.	Is the material presented through the					
	development of instructional science		$\langle \rangle$			
	material based on encyclopedia can	18				
	provide motivation to the students to	N/				
	study harder?	•				
8.	Is the evaluation instrument used to					
	measure the ability of students?					
9.	How is the material suitability with					
10	existing material?					
10.	Does the formulation of indicators					
	material based on angualanadia in					
	accordance with the basic					
	competencies specified in the					
	curriculum in 2013?					
L						

9th Appendix : Instrument Validation of Interactive Teaching Material by Student

No	Critorio	Score				
	Criteria	1	2	3	4	5
1.	Is the Instructional science material					
	based on encyclopedia make easy to					
2.	Is the picture presented interesting to					
	learn?					
3.	Is the picture presented accordance with the material?					
4.	Is the font and font size makes it easy to understand the material?					
5.	Do you easily understand the material	11				
	in this instructional science material					
	based encyclopedia?	20				
6.	According to you, how the questions of	7	D'			
	instructional science material based on	13	ETT			
	encyclopedia is accordance with the material?	e 1 ⁷	- 7			
7.	Is the language used in instructional	/				
	science material based on encyclopedia					
	is easy to understand?					
8.	According to the you, is the					
	instructional science material based on					
	encyclopedia that have been developed	5	X			
	is interesting to learn?	18				
9.	Is the instructional science material	ZL-				
	based on encyclopedia increase your					
1.2	motivation in learning?					
10.	Is using instructional science material					
	based on encyclopedia give you					
	encouragement in learning?					

10th Appendix : Pre-Test Sheets

PRE-TEST

NAMA :	NILAI
KELAS:	
NO. ABSEN :	

Pilihlah satu jawaban yang paling benar!

- 1. Mengapa ayam memiliki bentuk paruh yang pendek dan kuat?
 - a. karena ayam memakan daging
 - b. karena ayam tidak memiliki gigi
 - c. karena ayam memakan buah-buahan
 - d. karena ayam termasuk hewan pemakan biji-bijian
- 2. Apa fungsi paruh yang berbentuk seperti sudu dengan pangkal bergerigi pada bebek?
 - a. untuk memakan biji-bijian
 - b. untuk mencari padi di sawah
 - c. untuk menghaluskan makanan
 - d. untuk mencari makanan/ cacing di tempat becek, berlumpur, dan berair
- 3. Berapakah jumlah kaki laba-laba?
 - a. 4
 - b. 6
 - c. 8
 - d. 10
- 4. Ekor tikus berfungsi sebagai....
 - a. alat gerak
 - b. alat komunikasi
 - c. alat pendeteksi mangsa
 - d. alat keseimbangan dan pengatur suhu tubuh
- 5. Apa fungsi sayap pada ayam?

- a. untuk terbang di udara
- b. untuk melindungi tubuhnya
- c. untuk memikat lawan jenisnya
- d. untuk terbang saat melompat dari suatu ketinggian
- 6. Fungsi gigi seri pada kelinci adalah....
 - a. menelan makanan
 - b. mencabik-cabik makanan
 - c. sebagai hiasan pada mulut kelinci
 - d. memotong dan mengunyah makanan
- 7. Berikut merupakan fungsi jaring pada laba-laba, kecuali
 - a. sebagai hiasan
 - b. menjerat mangsa
 - c. membuat kantung telur
 - d. melindungi lubang sarang
- 8. Mengapa bulu bebek tidak basah saat berenang?
 - a. karena bulu bebek sangat tebal
 - b. karena bulu bebek sangat unik
 - c. karena bebek pandai berenang, sehingga bulunya tidak basah
 - d. karena bulu bebek dilapisi dengan lapisan minyak yang disebarkan melewati paruhnya
- 9. Berikut ini merupakan bagian dari tumbuhan kecuali....
 - a. daun
 - b. tanah
 - c. batang
 - d. bunga
- 10. Fungsi ekor pada sapi adalah....
 - a. alat gerak
 - b. mengusir lalat
 - c. menjaga suhu tubuh
 - d. menjaga keseimbangan
- 11. Bagian tumbuhan yang berfungsi sebagai tempat fotosintesis adalah....
 - a. akar

- b. daun
- c. bunga
- d. batang



Apakah fungsi sengat pada lebah?

- a. untuk menarik mangsanya
- b. untuk menggigit mangsanya
- c. untuk merangsang musuhnya
- d. untuk melumpuhkan mangsanya

Jenis akar pada gambar disamping adalah....



a. akar pendek

- b. akar serabut
- c. akar gantung
- d. akar tunggang

Bentuk tulang daun gambar di samping adalah....

- a. sejajar b. menjari
 - c. bergaris
 - d. menyirip
- 15. Yang menjadi pelindung biji pada tanaman adalah....
 - a. akar

14.

- b. daun
- c. buah
- d. bunga
POST-TEST

NAMA	:	NILAI
KELAS	:	
NO. ABSEN	:	

Pilihlah satu jawaban yang paling benar!

- 1. Apa fungsi sayap pada merpati?
 - e. untuk terbang di udara
 - f. untuk melindungi tubuhnya
 - g. untuk memikat lawan jenisnya
 - h. untuk terbang saat melompat dari suatu ketinggian
- 2. Berapakah jumlah kaki laba-laba?
 - e. 4
 - f. 6
 - g. 8
 - h. 10
- 3. Fungsi ekor pada sapi adalah....
 - e. alat gerak
 - f. mengusir lalat
 - g. menjaga suhu tubuh
 - h. menjaga keseimbangan



Apakah fungsi kumis pada kucing?

- a. untuk memakan makanan
- b. untuk menakuti mangsanya
- c. untuk pendeteksi lingkungan
- d. untuk melumpuhkan mangsanya
- Jenis akar pada gambar disamping adalah....
- a. akar pendek
- b. akar serabut



- c. akar gantung
- d. akar tunggang

Bentuk tulang daun gambar di samping adalah....



- a. sejajar
- b. menjari
- c. bergaris
- d. menyirip
- 7. Bagian tumbuhan yang berfungsi sebagai tempat fotosintesis adalah....
 - e. akar
 - f. daun
 - g. bunga
 - h. batang
- 8. Mengapa bulu bebek tidak basah saat berenang?
 - e. karena bulu bebek sangat tebal
 - f. karena bulu bebek sangat unik
 - g. karena bebek pandai berenang, sehingga bulunya tidak basah
 - h. karena bulu bebek dilapisi dengan lapisan minyak yang disebarkan melewati paruhnya
- 9. Berikut merupakan fungsi jaring pada laba-laba, *kecuali....*
 - e. sebagai hiasan
 - f. menjerat mangsa
 - g. membuat kantung telur
 - h. melindungi lubang sarang
- 10. Berikut ini merupakan bagian dari tumbuhan kecuali....
 - a. daun
 - b. tanah
 - c. batang
 - d. bunga
- 11. Yang menjadi pelindung biji pada tanaman adalah....
 - e. akar
 - f. daun
 - g. buah

- h. bunga
- 12. Ekor tikus berfungsi sebagai....
 - e. alat gerak
 - f. alat komunikasi
 - g. alat pendeteksi mangsa
 - h. alat keseimbangan dan pengatur suhu tubuh
- 13. Mengapa merpati memiliki bentuk paruh yang pendek dan kuat?
 - e. karena ayam memakan daging
 - f. karena ayam tidak memiliki gigi
 - g. karena ayam memakan buah-buahan
 - h. karena ayam termasuk hewan pemakan biji-bijian
- 14. Fungsi gigi seri pada kelinci adalah....
 - e. menelan makanan
 - f. mencabik-cabik makanan
 - g. sebagai hiasan pada mulut kelinci
 - h. memotong dan mengunyah makanan
- 15. Apa fungsi paruh yang berbentuk seperti sudu dengan pangkal bergerigi pada bebek?
 - e. untuk memakan biji-bijian
 - f. untuk mencari padi di sawah
 - g. untuk menghaluskan makanan
 - h. untuk mencari makanan/ cacing di tempat becek, berlumpur, dan berair

No.	Pre-test	Post-test
1.	D	А
2.	D	С
3.	С	В
4.	D	С
5.	D	D
6.	В	В
7.	ASLA	В
8.	DIALIK	D
9.	В	A
10.	В	В
11.	В	C
12.	D	D
13.	В	D
14.	В	В
15.	C C C	D

Answer Key



13rd Appendix : Activities Photographs





Pre-test



Students reading the material



Experiment in the Garden School



Experiment in the Garden School

With the head master, teacher and students 4th grade

14th Appendix : Curriculum Vitae



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