"THE DEVELOPMENT OF SCIENCE LEARNING MEDIA WIND POWER PLANT MINIATURE ON THE THEME ALWAYS SAVE ENERGY FOURTH GRADE STUDENTS TO UNDERSTANDING OF CONCEPT IN SD PLUS AL-KAUTSAR MALANG"

THESIS

Written by:

Suryaningtyas Puspa Wardhani

12140043

ISLAMIC PRIMARY TEACHER EDUCATION PROGRAM

TARBIYAH AND TEACHER TRAINING FACULTY

MAULANA MALIK IBRAHIM STATE ISLAMIC UNIVERSITY MALANG

Mei, 2016

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Presented to Tarbiyah and Teacher Training Faculty Maulana Malik Ibrahim Satate University Malang
in Partial Fulfillment of the Requirements for the Degree of Sarjana Pendidikan (S.Pd)

Written by:

Suryaningtyas Puspa Wardhani

12140043

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APPROVAL SHEET

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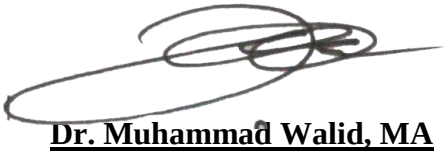
THESIS

Written by:
Suryaningtyas Puspa Wardhani
12140043

Approved by,
Supervisor

Dr. Muhammad Walid, MA
NIP. 1973082300001002

Acknowledge by,
The Head of Islamic Elementary Teacher Education Program



Dr. Muhammad Walid, MA
NIP. 1973082300001002

LEGITIMATION SHEET

APPROVAL SHEET
THE DEVELOPMENT OF SCIENCE LEARNING MEDIA WIND POWER PLANT MINIATURE ON THE THEME ALWAYS SAVE ENERGY FOURTH GRADE STUDENTS TO UNDERSTANDING OF CONCEPT IN SD PLUS AL-KAUTSAR MALANG

THESIS

Prepared and compiled by
Suryaningtyas Puspa Wardhani (12140043)
Has been defended in front of the board of examiners on
Mei, 2016
and has been approved by the board of examiners as the requirement for the degree of Sarjana Pendidikan (S.Pd)
on Mei, 2016

The Board Of Examiners		Signature
Main Examiner, Dr. H. Mulyono, MA NIP. 196606262005011003	:	
Secretary, Dr. Muhammad Walid, MA NIP. 1973082300001002	:	
Advisor, Dr. Muhammad Walid, MA NIP. 1973082300001002	:	
Chair Examiner, Dr. Mohammad Samsul Ulum, MA NIP. 197208062000031001	:	

Approved by,
Dean of Tarbiyah and Teaching Training Faculty of Maulana Malik Ibrahim State Islamic University Malang

Dr. H. Nur Ali, M. Pd
NIP. 19650403 199803 1 002

DEDICATION

By reciting Bismillah and Alhamdulillah, I dedicate this my little work to:

Adoration and gratitude to Allah SWT. A sprinkling of love and affection-Mu has given strength, equip with knowledge and introduced me to the love. For the grace and ease that you give this simple thesis eventually be resolved. Sholawat and salam always overflow to the king's Prophet Muhammad.

To Beloved Father and mother As a sign of devotion, respect, and gratitude is immeasurable dedicate little work this to my father and mother who have given affection, all the support and love immeasurable that nothing may be able to repay only with a sheet of paper with the word love and offerings. May this be the beginning to make Father and Mother happy because I realized that all this time has not been able to do more. For Mother and Father always made me motivated and always watered affection, always pray for me, has always advised me to be better.

Thanks Father ... .ThanksMother ...

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MOTTO

تَغْلُوالَاالْكِتَابِأَهْلَيَاقُلْ فِي دِينِكُمْ غَيْرَ الْحَقِّ وَلَا تَتَّبِعُوا أَهْوَاءَ قَدْقَوْمٍ

ضَلُّوا مِنْ قَبْلُ وَأَضَلُّوا كَثِيرًا وَضَلُّوا عَنْ سَوَاءِ السَّبِيلِ(77)

The mean: *Say (Muhammad), "People of the Scripture! Do not exaggerate (transgressors) in a way not true in religion, and do not follow the desires of those who had lost first, and (have) misled many (human), and they themselves stray from the straight path " (Al-Maidahayat 77)*

Dr. Muhammad Walid, M.A
The Lecture of Tarbiyah and Teaching Training Faculty
The State Islamic University of Maulana Malik Ibrahim Malang

ADVISOR OFFICIAL NOTE

Matter : Thesis of SuryaningtyasPuspaWardhani Malang, Mei 23th 2016
Appendixes : 6 (six)Exemplar

To,
The Dean of Faculty of Tarbiyah and Teacher Training
State Islamic University of Maulana Malik Ibrahim Malang
At
Malang

Assalamu'alaikum, wrwb

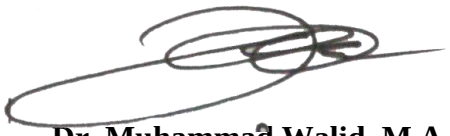
Having read all the chapters carefully in terms of its contents, language and writing technique, I testify that this following thesis written by:

Name : SuryaningtyasPuspaWardhani
NIM : 12140043
Program : Islamic Elementary Teacher Education
Tittle of Thesis: The Development of Science Learning Media Wind Power Plant Miniature on the Theme Always Save Energy Fourth Grade Students to Understanding of Concept in SD Plus Al-Kautsar Malang

As her main supervisor, I considered that this thesis is qualified to be proposed in the examination.

Wassalamu'alaikum, wrwb

Supervisor,



Dr. Muhammad Walid, M.A
NIP. 197308232000031002

CERTIFICATE OF THESIS AUTHORSHIP

I certify that the thesis I wrote to fulfill the requirement for Sarjana Pendidikan (S.Pd) entitled *The Development of Science Learning Media Wind Power Plant Miniature on the Theme Always Save Energy Fourth Grade Students to Understanding of Concept in SD Plus Al-Kautsar Malang* is truly my original work. It does not incorporate any materials previously written or publish by another person. Except those indicated in quotations and bibliography. Due to fact, I am the only person who responsible for the thesis if there is any objection or claim from others.

Malang, Mei 23th 2016

Suryaningtyas Puspa Wardhani

PREFACE

Alhamdulillah Praise Allah SWT writer who has give a mercy, taufiq and guidance, so that writer can finish this thesis with the title "*The Development of Science Learning Media Wind Power Plant Miniature on the Theme Always Save Energy Fourth Grade Students to Understanding of Concept in SD Plus Al-Kautsar Malang".*

Prayers and greetings is always devoted to lord the king of the Prophet Muhammad, the family, friends, and followers who have brought the truth of the whole human user *al-Dinnul Islam*we expect his intercession in the world and the hereafter.

The writing and preparation of this is intended to complement the overall learning activities that have been declared by the State University of Maulana Malik Ibrahim Malang as a form of accountability author was a student State University of Maulana Malik Ibrahim Malang and meet one of the requirements to obtain a Bachelor Degree of Education of Islamic Elementary Teachers in UIN Maliki Malang.

The writer are fully aware that the limited capacity and lack of experience, many obstacles and difficulties encountered in the preparation is always the author of this thesis. By finishing this thesis, the writer do not forget to say thanks to all those

who provide direction, guidance and guidance in the preparation of this paper, with all humility, say thanks you to:

1. Dear people, dear parents (Mr. Sunar), (Mrs.Sunarti) and brother and sister (Dra. SundariEkowati, M. Kom, Sudarsono, S.sos and WeniWidyanti) as well as extended family who always give prayer blessing, motivation and their love is always shining on my way.
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3. Dr. H. Nur Ali, M. Pd, as Dean of Tarbiyah and Teacher Training Faculty.
4. Dr. Muhammad Walid, M.A, as Chairman of Islamic Elementary Teacher Program.
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7. Mr. and Mrs. Lecturer UIN Maliki who has guided me during learning in the lecture bench.

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No words spoken other than of gratitude should deepest and sincere prayer, may Allah SWT will always bestow grace and matchless reply to all those who have helped up to the completion of this thesis. Amiin.

The writer realizes its full weakness, resulting in completing this thesis there is still a lot of mistakes and shortcomings. The writer expects their comments and suggestions from all people to enhance this research.

With all humility, authors hope that this simple thesis can be useful for the writer himself in particular and to the general reading. Amiin.

Malang, Mei 23th 2016

The writer

Suryaningtyas Puspa Wardhani

12140043

GUIDELINES FOR ARABIC-LATIN TRANSLITERATION

Arab-Latin transliteration writing in this thesis uses the transliteration guidelines based on a joint decision of the Minister of Education and Culture number. 158 year 1987 and number. 0543/b/U/1987 can be broadly described as follows:

A. Letter

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

B. Vocal

Vocal (a) length = â

Vocal (i) length = î

Vocal (u) length = û

C. Vocal Diphthong

أَوْ = aw

أَيْ = ay

اُوْ = û

اِيْ = î

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ABSTRAK

Wardhani, Suryaningtyas Puspa. 2016. *Pengembangan Media Pembelajaran IPA Miniatur Pembangkit Listrik Tenaga Angin Pada Tema Selalu Berhemat Energi Kelas IV Untuk Meningkatkan Pemahaman Konsep (SD Plus Al-Kautsar Malang).* Skripsi, Jurusan Pendidikan Guru Madrasah Ibtidaiyah, Fakultas Ilmu Tarbiyah dan Keguruan, Universitas Islam Negeri Maulana Malik Ibrahim Malang. **Pembimbing:Dr. Muhammad Walid, M.A**

Sains memiliki empat unsur utama, yaitu sikap, proses, produk dan aplikasi, sehingga pembelajarannya menekankan pada pemberian pengalaman secara langsung untuk mengembangkan kompetensi agar memahami alam sekitar secara alamiah. Untuk mewujudkan pembelajaran tersebut maka dibutuhkan pengembangan media pembelajaran berupa alat peraga yang menjelaskan konsep melalui percobaan sehingga mampu meningkatkan pemahaman konsep siswa khususnya pada tema selalu berhemat energi.

Rumusan masalah dari penelitian ini yaitu: (1) Bagaimana proses pengembangan media alat peraga miniatur pembangkit listrik tenaga angin pada tema selalu berhemat energi kelas 4 untuk meningkatkan pemahaman konsep pada materi perubahan energi gerak menjadi listrik, (2) Bagaimana efektivitas media miniatur Pembangkit Listrik Tenaga Angin untuk meningkatkan pemahaman konsep dalam pembelajaran ilmu pengetahuanalam kelasIV SD tema selalu berhemat energi, (3) Apakah ada perbedaan pemahaman konsep anatara siswa kelas IV yang menggunakan alat peraga miniatur Pembangkit Listrik Tenaga Angin dengan siswa yang tidak menggunakan alat peraga miniatur Pembangkit Listrik Tenaga Angin.

Penelitian ini menggunakan jenis penelitian *pengembangan Research and Development (R & D)*, dengan menggunakan model *Borg and Gall.* Penelitian ini dilaksanakan di SD Plus Al-Kautsar Malang dengan mengambil sampel kelas IV A dan IV B yang berjumlah 15 siswa masing-masing kelas. Tujuan dari penelitian ini yaitu untuk mengembangkan media pembelajaran IPA miniatur pembangkit listrik tenaga angin pada tema selalu berhemat energi kelas IV untuk meningkatkan pemahaman konsep siswa, meningkatkan keaktifan siswa, serta meningkatkan motivasi siswa dalam proses pembelajaran di kelas.

Dari proses pengembangan media miniatur pembangkit listrik tenaga angin melalui beberapa proses: Tahap studi pendahuluan dengan melakukan analisis

kebutuhan merupakan langkah yang paling penting untuk melakukan pengembangan yaitu mengumpulkan berbagai informasi, baik dari hasil observasi, dan wawancara. Kegiatan ini sangat mudah dilakukan karena dengan mengumpulkan berbagai informasi pengembang dapat mengetahui secara langsung kondisi nyata dilapangan. Hasil observasi dan wawancara tersebut dapat dijadikan langkah awal untuk mengembangkan produk, perumusan masalah dan tujuan merupakan hal pokok yang harus dilakukan sebelum merancang suatu pengembangan media. Sebab dengan penetapan tujuan dapat diketahui arah suatu produk yang akan dikembangkan.

Dari keefektifan, menunjukkan bahwa pengembangan alat peraga ini menunjukkan keefektifan, terbukti dari media alat peraga yang dilengkapi dengan compact disk sebagai petunjuk pemakaian alat peraga. Hal ini dapat dilihat dari proses kegiatan pembelajaran yang dilakukan pada kelas eksperimen. Pada aspek ketepatan alat peraga dengan tujuan pembelajaran dinilai sudah sesuai. Alat peraga yang dikembangkan sudah mencakup konsep maupun generalisasi materi energi dan perubahannya yang memerlukan media dalam memahaminya.

Berdasarkan hasil penelitian didapatkan bahwa media pembelajaran IPA medapatkan penilaian kualifikasi yang baik, karena berdasarkan hasil validasi diperoleh nilai dari ahli materi sebesar 98% yang berarti alat peraga sangat valid dan tidak revisi, nilai dari ahli desain media sebesar 94% yang berarti alat peraga mendapatkan kualifikasi sangat valid dan tidak revisi, sedangkan nilai dari ahli pembelajaran yaitu guru tematik sebesar 92,5% yang berada pada kualifikasi valid dan tidak revisi. Dengan perhitungan menggunakan uji t dengan tingkat kemaknaan 0,05 diperoleh hasil $t_{hitung} \geq t_{tabel}$ yaitu 2,58≥2,14 artinya H_0 ditolak dan H_1 diterima.

Dilihat dari adanya tingkat perbedaan yaitu signifikan dapat meningkatkan pemahaman konsep siswa kelas IV SD Plus Al-Kautsar Malang. Dengan melihat rerata posttest kelas kontrol yang lebih kecil dibandingkan kelas eksperimen yaitu 81,53 < 90,27. Kesimpulannya ada perbedaan pemahaman konsep antara siswa kelas IV B yang menggunakan alat peraga miniatur PLTA (angin) pada tema selalu berhemat energi dengan siswa kelas IV A yang tidak menggunakan alat peraga miniatur PLTA (angin) pada tema selalu berhemat energi.

Kata Kunci: *Pengembangan media, IPA, pemahaman konsep*

ABSTRACT

Wardhani, Suryaningtyas Puspa. 2016. *The Development of Science Learning Media Wind Power Plant Miniature On The Theme Always Save Energy Fourth Grade Students To Understanding Of Concept (SD Plus Al-Kautsar Malang).* Thesis, Department Of Islamic Elementary Teacher Education And Teaching Science Faculty, State Islamic University Of Maulana Malik Ibrahim Malang. Advisor: **Dr. Muhammad Walid, M.A**

Science has four main elements, namely attitudes, processes, products and applications, so learning emphasizes providing direct experiences to develop competency in order to understand the nature around naturally. To realize that learning is required development of instructional media in the form of props that explains the concept through trial so as to improve students' understanding of concepts, especially on the theme always save energy.

The problems of this study are: (1) How is the process of development of media props miniature wind power on a theme always save energy class 4 to improve the understanding of the concept to material changes in the energy of motion into electricity, (2) How is the effectiveness of media miniature Power wind to improve understanding of concepts in teaching natural science grade elementary school theme always save energy, (3) Is there a different understanding of the concept between fourth grade students who use props miniature wind Power with students who do not use props miniature Power Wind.

This research uses research and development Research and Development (R & D), using the model of the Borg and Gall. This research was conducted in SD Plus Al-Kautsar Malang by taking samples of class IV A and IV B, amounting to 15 students in each class. The purpose of this study is to develop science teaching media miniature wind power plant on the theme always save energy class IV to improve the understanding of the concept of students, increase student activity, and increase the motivation of students in the learning process in the classroom.

From miniature media development process of wind power through several processes: a preliminary study phase to conduct a needs analysis is the most important step to development which collects a variety of information, both from observation, and interviews. This activity is very easy to do because by collecting a variety of information developers can directly find the real conditions in the field. Observations and interviews can be used as an initial step to develop the product,

formulation problems and goals are key things to do before designing a media development. Because the goal setting can be seen toward a product that will be developed.

The effectiveness, suggesting that the development of these props show effectiveness, as evidenced by the media props are equipped with a compact disk as a user guide props. It can be seen from the process of learning activities carried out in the experimental class. In the aspect of the precision of the props with the purpose of learning is considered to be appropriate. Props are developed already includes concepts and generalizations energy materials and amendments requiring the media to understand.

Based on the results that the medium of learning science obtain the qualification assessment was good, because it is based on the validation results obtained value of subject matter experts by 98% which means the props are very valid and no revision, the value of design experts media by 94% which means the props get qualified very valid and no revision, while the value of thematic learning experts that 92.5% of teachers who are in the qualification is valid and not a revision. By calculation using t test with significance level of 0.05 was obtained results t_{count} which $\geq t_{table}$ 2,58≥2,14 means H_0 and H_1 accepted.

So, media science learning miniature wind power proved to significantly improve understanding of the concept of fourth grade students of SD Plus Al-Kautsar Malang. By looking at the average posttest control class is smaller than the experimental classwhich 81.53 <90.27. In conclusion there are differences between the understanding of the concept of fourth grade students who use props and wind power plant miniature on the theme always save energy with a fourth grade students who did not use props wind power plant miniature on the theme always save energy.

Keywords: Media development, Science, Understanding Of The Concept

مستخلص

ورداني، سريانينجتياس فوسفا. 2016. **تطوير وسيلة التعليم منمنم منشط الكهرباء بالريح للعلم الطبيعي في موضوع دوام الاقتصاد على ديناميكية في الفصل الرابع لترقية فهم النظرية (المدرسة الإبتدائية الفاضلة الكوثر مالانق)**. البحث الجامعي، قسم تربية المعلمين للمدرسة الإبتدائية، كلية علوم التربية والتعليم، جامعة مولانا ماكل إبراهيم الإسلامية الحكومية مالانق. المشرف: الدكتور محمد والد الماجستير.

للعلوم أربعة عناصر الأساسي، هم الموقف، والعملية، والإنتاج، والتطبيق. تعليم العلوم يركز في إعطاء الخبرة المباشرة لتطوير الكفاءة كي يفهم التلميذ البيئة عالميا. فنحتاج إلى تطوير الوسيلة التعليمية مثل الأداة العارضة التي تشرح النظرية من خلال التجربة لتحقيق ذلك التعليم حتى تكون بهذه الأداة سترفع فهم التلميذ خاصة في موضوع "دوام الإقتصاد على ديناميكية".

أسئلة البحث: 1) كيف عملية تطوير وسيلة أداة العرض منمنم منشط الكهرباء بالريح في موضوع دوام الإقتصاد على ديناميكية للفصل الرابع لترقية فهم نظرية مادة تحويل ديناميكية الحركية إلى ديناميكية الكهربائية؟ 2) كيف فعالية وسيلة منمنممنشط الكرباء بالريح لترقية فهم نظرية التعليم العلوم الطبيعية للفصل الرابع بالمدرسة الإبتدائية بموضوع دوام الإقتصاد على الديناميكية؟ 3) هل هناك الفرق بين فهم النظرية بين التلميذ الفصل الرابع الذي يستخدم منمنم منشط الكهرباء بالريح وإلا؟

هذا البحث يستخدم نوع البحث التطوير بنماذج بورغ وغال (*Borg and Gall*). هذا البحث في المدرسة الإبتدائية الفاضلة الكوثر مالانق بعينة الفصل الرابع أ وب، عدد التلاميذ خمسة عشر تلاميذ في كل الفصل. هذف البحث أن تطور الباحثة وسيلة التعليم للعلم الطبيعي بوجود الأداة العرضية من منشط الكهرباء بالريح في موضوع دوام الإقتصاد للفصل الرابع لترقية فهم النظرية التلميذ، وترقية نشاط التلميذ، وترقية دافع التلميذ في عملية التعليم داخل الفصل.

عملية تطوير وسيلة منمنم منشط الكهرباء بالريح لها الخطوات. البحث المبدئي بتحليل الحاجة ولمشكلة هي الخطوة المهمة للتطوير أي بجمع المعلومات من نتيجة الملاحظة والمقابلة. هذه

الأنشطة سهلة لأن من خلال جمع المعلومات فتعرف المطورة مباشرة كيف أحوال الواقعي في الميدان. نتيجة الملاحظة والمقابلة لتطوير الإنتاج، رمز أسئلة البحث وأهدافه هم الأشياء الأساسية قبل التصميم وتطوير الوسيلة لأن بتعيين الأهداف فتعرف الباحثة تجاه الإنتاج المطور.

من جهة الفعالية، فنتيجة البحث تشير على أن تطوير أداة العرض فعالا. هذا بدليل وسيلة الأداة العرضية المتكاملة بالأسطوانة فيها إرشادة استخدام الأداة العرضية. هذه الفعالية نظرا من عملية التعليم في الفصل التجربي. من جهة دقة الأداة العرضية تناسب بهدف التعليم. الأداة العرضية المطورة قد شملت النظرية أو تعميم المادة الديناميكية وتحويلها التي تحتاج الوسيلة في فهمها.

اعتمادا على نتيجة البحث، فتعرف الباحثة أن وسيلة التعليم للعلم الطبيعي تنال نتيجة جيدة لأن نتيجة التصديق من خبير المادة 98% بمعنى صدق جدا دون الإصلاح، نتيجة من خبير تصميم الوسيلة 94% بدرجة صدق جدا دون الإصلاح، نتيجة من خبير التعليم وهو مدرس العلم الطبيعي الموضوعي 92،5% بدرجة صدق دون الإصلاح. فبحساب الاختبار "ت" بدرجة المعنى 0،05 فنتيجته "ت" حساب ≤ "ت" جدول 2،58≤2،14 بمعنى فرض صفري مردود وفرض واحدي مقبول.

نظرا من وجود درجة الفرق معنوية وهذه تستطيع أن ترفع فهم نظرية التلميذ الفصل الرابع بالمدرسة الإبتدائية الفاضلة الكوثر مالانق. اعتمادا على متوسط الاختبار النهائي من الفصل الضابط أدنى من نتيجة الفصل التجربي 81،53>27،90. فالاتنباط هذا البحث أن هناك الفرق في فهم النظرية بين تلاميذ الفصل الرابع ب الذين يستخدمون الأداة العرضية منمنم منشط الكهرباء بالريح في موضوع دوام الإقتصاد على الديناميكية بتلاميذ الفصل الرابع أ الذين لايستخدمون أداة العرض منمنم منشط الكهرباء بالريح في موضوع دام الإقتصاد على الديناميكية.

الكلمات المفتاحية: تطوير الوسيلة، العلم الطبيعي، فهم النظرية

CHAPTER I

INTRODUCTION

This chapter will discuss about: (a) Background of the problem (b) Problem of the research, (c) The objectives of research and development, (d) The Significances of study (e) Product specification developed, (f) Assumptions and limitations of the development, (g) Definition of key term (h) Previous of research, and (i) Systematics research.

A. Background of the Problem

Natural Sciences (IPA) is the study of objects that exist in nature, both of which can be observed with the sense or not observable by the senses. IPA not only as a lesson, but also as an educational tool as listed in the Bloom taxonomy that

> IPA is expected to provide knowledge (cognitive), which is the primary purpose of learning. The type of the specified knowledge is a basic knowledge of the principles and materials that are useful for everyday life. Knowledge in the outline about the fact that there is in nature to be able to understand and deepen further, and see the description as well as arrangement.In addition to that, learning science is expected to also provide skills (psychomotor), ability of scientific attitudes (affective), understanding, and appreciation. In searching for an answer to a problem. Because of the characteristics that differentiate with other learning.[1]

[1]Trianto, *Model PembelajaranTerpadu*.(Jakarta: BumiAksara, 2010), hlm. 142.

The learning of natural science in the elementary school more emphasizes on the provision experience directly in everyday life, so that students can find facts, developing concepts, theories and scientific attitudes that can be a positive effect to the quality of the educational process or product education.

The learning of natural science which has related with the everyday life demands a teacher can provide learning materials and learning media close to the original concept of the error does not occur in order that by the time the learning process takes place. This is due to the theory of cognitive development Piaget that elementary school students including on concrete operational stage which at this stage was the beginning of rational thinking. This means, that a child can only be invited to think logically for reasoning can be applied to specific examples and concrete. For example, concrete operational thinker cannot imagine the steps needed to solve equations algebra, that is too abstract for this stage of development of thinking.[2]So need the media props for natural sciences appropriate to elementary school students support the understanding of students against the material.

Media serves as a guide for learners who will be directing all the activities in the process of learning and also as a means of evaluation of the achievement of the learning results. The media props in the process of learning an important position because the media props is a tool that can easily hang the students in the learning

[2]John W. Santrock, *PerkembanganAnak*, terj., Mila Rachmawatidan Anna Kuswanti (Jakarta:Erlangga,2007),hlm.50.

process. In the absence of the media props not learning success can be realized. The suitability of the media props with the objective or the expected competencies, will determine whether or not the objectives are achieved or expected learning competencies.

Props in learning the IPA can clarify the presentation of information on the IPA has been conveyed lessons teacher. Props for Natural Science is the learning props made specifically for IPA lessons.[3] Especially in the matter of energy, for example in the manufacture of wind energy with windmills using props. Not only wind energy can use props because energy there is an assortment of mechanical energy, chemical energy, electromagnetic energy, electrical energy, the energy of motion, and nuclear energy. Of all the messes that energy we can create props for use in learning the IPA in order to facilitate the students understand a concept of IPA. Energy is the ability to do work or effort.[4] Energy cannot be created or destroyed, energy can only be converted from one form to another form.[5]

Based on the results of observation and interview the author on Tuesday 27th October 2015 with mother Ririn, s. Pd as a homeroom teacher at once 4 thematic in SD Plus Al-Kautsar Malang, explaining that there were props in the school already adequately so that teachers could use it when thematic learning takes place especially

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[3]Siska Dewi, " Pengembangan Alat Peraga Pembelajaran Berbasis Teknologi Murah Materi Radiasi Kalor Dan Tekanan Hidrostatik". "*Skripsi".* (Lampung; Program Studi Pendidikan Fisika Universitas Lampung, 2011, hlm 8.

[4]Andarini Trisnasari," *Rahasia Sains Ensiklopedia Sains untuk Anak*". (Jakarta Timur: Rizky Grafis: 2008), hlm. 2.

[5]*Ibid,* hlm. 2

learning the IPA. In fact each thematic learning especially IPA teacher always invites students to laboratories to do the practical work. But sometimes the practical work done in class or outside of the classroom so that students do not feel the bored. If the props in the laboratory does not exist, the teacher will provide it myself as on thematic learning in particular to the study of natural science (IPA) on the theme of 2 sub theme 2 utilization of energy with the basic competencies 4.3.3 understand the relationship between force, motion, and energy through observation, and describes its application in the life of everyday. The teacher provides the bekel ball, baseball, and football pimpong.[6]

The problem here is when the practice of thematic learning especially science teachers told students to make media props in accordance with book, and never to develop the media in particular on the theme always save energy. The teacher realizes that haven't been able to develop a media that is in the book. Even on the material energy, changes in the school laboratory is not available the material props.[7]

The results of the interview has been done by researchers on 16 October 2015 with some students 4th grade Plus Al-Kautsar Malang said that a teacher always told to make media props in accordance with book, and never to develop the medium. When students want to once can make or observe the media in his book can be

[6]Dokumen Pribadi, "*Wawancara dengan Ibu Ririn Kusmiati*, S.Pd." Pada tanggal 27 Oktober 2015, pukul 08.10 wib

[7]Dokumen Pribadi, "*Observasi kelas 4 di SD Plus Al-Kautsar Malang*." Pada tanggal 27 Oktober 2015, pukul 08.10 wib

developed with a simple and interesting students. Students also have never observed the media about energy changes.[8]

Thematic study on sub theme always save energy ask students to do experiments and observations to make watermills and windmills later from the observations that students are able to present a report on the results of experiments and observations about watermills and windmills using raw vocabulary and correct in accordance with the learning objectives to be accomplished. Students must first find out about the various energies that exist in the surrounding environment, then the energy changes. On the thematic theme 2 learning always downsize energy, sub theme 1, various sources of energy, learning 2 also describes changes to electrical energy.

Students want in such learning not only demonstrated by turning on the switch the lights only, but students want to observe or make a how wind energy, or energy that water could generate electricity as in the thematic book reading theme 2 always save energy on page 8 energy by the movement of the wind turbine can be changes of motion into electrical energy.

The energy change is the material that exists around us especially in everyday life which is often done by students but students difficult to observe the environment around, then the required settlement by way of developing such a product be props so able to improve student learning outcomes.

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[8]Dokumen Pribadi, "*Wawancara pada beberapa siswa kelas 4 Sd Plus Al-Kautsar Malang*." Pada tanggal 16 Oktober 2015, pukul 10.00 wib

See the description above, then on the theme 2 sub theme 1 learning 2 IPA material learning changes the energy need of the media props capable of concrete presented in the form of the material itself. The media props is the modification of the tools and materials that are simple, inexpensive, and easy to get around the environment. Props in this energy change material using materials such as: plywood/cardboard, glue the former Eagle wood, saws, rulers, pencils, former bicycle Dynamo, led lights, wire, solder, a fan of the former, cat, flannel fabrics, Cork, sponge, wire and glue gun. Using a simple and cheap it will generate interesting props so that students are interested to observe or make it. Students will be able to present the props in the form of concrete from the material itself as characteristici.e. Science Learning in the form of facts, and presented in concrete.

Seeing the situation, researchers want to develop media props used by the SD Plus setia1heri Malang by using simple ingredients. With the media props on Theme 2 sub theme 1 learning 2, IPA subjects Learning is expected to encourage students to enhance learning outcomes, increasing motivation and interest in learning. Based on the above background exposure, researchers interested in conducting research and development with the title "***The Development of Learning Media Wind Power Plant Miniature on the Theme Save Always Energy Fourth Grade Students to Understanding of Concept in SD Plus Al-KautsarMalang*** ".

B. Problem of the Research

Based on the background described above, then the problem of the research development of instructional media IPA miniature Wind Power on two themes of natural science subjects are as follows:

1. How is the process of the development of the media props miniature wind power plant on the theme always save energy grade 4 to improve the understanding of the concept of material changes to the energy of motion into electricity?
2. How is the effectiveness of media miniature Wind Power to improve understanding of concepts in natural science teaching fourth grade theme always save energy?
3. Is there a difference between the understanding of the concept of fourth grade students who use miniature props Wind Power with students who do not use miniature props Wind Power?

C. The Objectives of Research and Development

Based on the problem of the research above, this research aims to:

1. To process a product in the form of miniature props Wind power plant on subjects natural science fourth gradeclass theme always save energy.
2. To know the effectiveness of the development of props to enhance the understanding of the concept of learning science theme always save energy through the use of props miniature Wind Power in fourth grade theme always save energy.

3. To know the difference between the concept of understanding the students who use the media props miniature Wind power plant with students who do not use props miniature Wind power plant.

D. The Significances of Study

With the objectives of this research, he knew the results of this research are expected to be useful:

1. Theoretically, to add their insights, knowledge, and experience are very important in the development of the media props miniature Wind power plant science lesson theme always save energy especially in the SD Plus Al-Kautsar Malang.
2. For school institutions, provide input in order to improve the quality of learning that is not glued to the book.
3. For science subjects teachers or classroom teacher can take advantage of simple props media in learning IPA theme always save energy. Besides, it can also encourage teachers to motivate learning and can provide learning experiences directly to students through experiments on the theme always save energy.
4. For students can provide the motivation to be more interested in learning the IPA using media props miniature Wind power plant so as to improve the understanding and interest of students in learning the IPA that with simple ingredients that could be used for teaching about energy changes.

E. Product Specification Developed

This research will produce products for teachers and students in the form of props. The resulting props are props that can be used by students in learning independently or with the guidance of the teacher with the following specification:

1. The theme developed is a theme always save energy on the various energy sources lesson 2 in the fourth grade.
2. The design of these props using simple material choice according to need, so that students would be interested to learn about the various sources of energy.
3. The resulting props is a miniature wind-power plant that is to rotate the propeller fan by using the hands, then dynamo will spin and the lights will turn on. The energy change is the change the energy of motion into electrical energy (energy conversion), so that it becomes a unity in the props.
4. The physical form of the product resulting in the development of this form of props.
5. Product media props is complemented with a Compact Disk which media use props instructions in making props.

F. Assumptions and Limitations of the Development

1. Assumptions

Some assumptions underlying the development of the energy theme props always save energy include:

a. Props energy materials science learning theme always save energy can further increase the creativity of teachers and students in the experiment activities.
b. Props made simple and easy to get, by using a material as simple as possible so as to have a theme of energy effectiveness in the learning always save energy.
c. Unavailability of props developed by teachers, for teachers too focused on props in the 2013 curriculum guide books.
d. Teachers of natural science are still difficulties in developing media props.

2. Limitations Development

Limitations in product development props are:

a. Product development of props is limited to the material of wind energy, electrical energy, which is in the fourth grade energy-saving theme is always composed of the following subjects:
   1) Resources of Electric Energy
   2) Wind Energy Resources
b. Object Development Limited props miniature Wind power plant in SD Plus Al-Kautsar Malang.
c. Assessment of validity in miniature props Wind Power is performed by 3 experts validator, which is a material expert validator, the validator props media experts, and teachers of science in SD Plus Al-Kautsar Malang as learning experts.

d. Assessment of validity on media props natural science theme always save energy is done by the field trials in grade IV SD Plus Al-Kautsar Malang.

G. Definition of Key Term

To avoid confusion in understanding or interpreting of the existing terms, the author gives the affirmation and discussion of the terms related to the title of the research include the following:

1. Development

   Development is the process of translating the design specifications into a particular physical form. The process of translating the design specifications include the identification of problem formulation of learning objectives, strategy development or teaching methods and evaluation of the effectiveness, efficiency and attractiveness of learning.[9]

   In this research, the development focused on the development of miniature props Media Wind Power always save energy theme fourth grade learning 2.

2. Learning Media

   Media Learning is defined as anything that can be used to convey a message of learning. Learning Media is a component of learning resources or physical vehicle containing instructional materials in the student environment

[9]FitrotulUyun,"PengembanganBahanAjarPembelajaranAl-Qur'anHadisdengan PendekatanHumeneutikbagiKelasV MIN1 Malang", *Thesis*,(Malang:ProgramPascasarjana UniversitasIslamNegeriMalang,2010),hlm.21.

that can stimulate students to learn.[10] The media are also learning as a means to enhance the teaching and learning activities.[11]

3. Props

Props are one or a set of concrete objects (tools) that are created or arranged intentionally to help embed or develop concepts, facts and principles in learning.[12]

4. The Props As Instructional Media

Props which is one of the educational media is a tool to assist in the teaching and learning process in order to make the communication process can be managed properly and effectively. Based on the description it is obvious that the media or the teaching is everything that can be used to transmit messages and can stimulate the mind, feelings, attentions, and willingness of students so as to encourage the occurrence of the learning process to the students.[13]

[10]Siska Dewi, " Pengembangan Alat Peraga Pembelajaran Berbasis Teknologi Murah Materi Radiasi Kalor Dan Tekanan Hidrostatik". "*Skripsi"*. (Lampung; Program Studi Pendidikan Fisika Universitas Lampung, 2011, hlm. 8

[11]Cecep Kustandi dan Bambang Sutjipto," *Media Pembelajaran*". (Bogor: Penerbit Ghalia Indonesia, 2011), hlm. 9

[12]Siska Dewi, " Pengembangan Alat Peraga Pembelajaran Berbasis Teknologi Murah Materi Radiasi Kalor Dan Tekanan Hidrostatik". "*Skripsi"*. (Lampung; Program Studi Pendidikan Fisika Universitas Lampung, 2011, hlm. 12

[13]Ibid, hlm. 13

5. Natural Science

The nature of science is a branch of knowledge concerning facts which are systematically arranged and showing the enactment of the general laws, facts, and evidence that can be observed the truth based on experiments.[14]

6. Understanding The Concept

Understanding of the concept is the level of ability that expect students to understand the concept, the situation and the facts are known, and can explain with words themselves in accordance with their knowledge, by not changing the meaning.[15]

H. Previous of Research

Research on the development of the media props has a lot to do. Some related research orientation of the above research include:

1. Research development conducted by SiskaDewi in 2011 under the title *The development of Technology Based Learning Viewer Tool Offers Heat Radiation Material And Hydrostatic Pressure.* The study resulted in a product's technology-based learning tools for learning the physics of matter and the heat radiation hydrostatic pressure accompanied by LKS. By using the method of research and development refers to the Education Research and Introduction of Borg and Gall, ie in the development of the media of the procedures of product

[14]Subiyanto, " *Strategi Belajar Mengajar Ilmu Pengetahuan Alam*". (Malang: IKIP Malang, 1990), hlm. 3-4.

[15]Purwanto, *Prinsip-prinsipdanteknikevaluasipembelajaranpendidikan*, (Bandung: Rosdakarya, 2008), hlm.11

development and testing of products in practice instructional internal test (product as a medium of learning) is done without separating the test specifications and test product quality , The difference using props cheap technology-based learning materials and the heat radiation hydrostatic pressure, to increase the understanding of the concept. The equation is equally create props.[16]

2. Research development conducted by EmyliaNovita in 2014 under the title "The development of IPA Simulator Viewer Tool To Enhance Understanding Creative Concepts Work Systems Heart in class V MIN RejosoDarulUlumJombang". The study resulted in products props simulator work system of heart in its aim to improve the understanding of the concept of cardiovascular system. By using research methods Research and Development, design models Borg and Gall. The difference using props simulator IPA, to enhance students' understanding. The equation makes props.[17]
3. Research media and learning methods performed by RuzitaSumiati and AidilZamri in 2013 with the title "Design of Wind Turbine Power Plant Miniature Media Learning". The study resulted in products props Miniature Wind Turbine Power Generation Media. Learning with the aim to encourage

[16]Siska Dewi, " Pengembangan Alat Peraga Pembelajaran Berbasis Teknologi Murah Materi Radiasi Kalor Dan Tekanan Hidrostatik". "*Skripsi"*. (Lampung; Program Studi Pendidikan Fisika Universitas Lampung, 2011

[17]Emylia Novita, F," Pengembangan Alat Peraga Simulator IPA "UntukMeningkatkanPemahamanKonsepMateriSistemKerjaJantungkelas V di MIN DarulUlumRejosoJombang". *"Skripsi*". (Malang: Program Studi Pendidikan Guru Madrasah Ibtidaiyah UIN Malang, 2014)

motivation and interest of students in the learning process. By using experimental research methods research is to make observations to search for data in a process of cause and effect through experiments in order to know the influence of the angles on the performance of wind turbines. The difference using props miniature wind turbine savonius, to improve the understanding of the concept. The equation same-made miniature props.[18]

Here the authors also use tables in order to make it easier to understand.

[18]Ruzita Sumiati dan Aidil Zamri,"Rancang Bangun Miniatur Turbin Angin Pembangkit Listrik Media Pembelajaran.*"Jurnal Teknik Mesin*". (Padang: Program Studi Teknik Mesin Politeknik Negeri Padang, 2013)

TABLE1.1
Previous of Research

NO	PROFIL	RESULTS RESEARCH	RESEARCH METHODS	EQUATION	DIFFERENCE
1	Researchand development conducted by SiscaDewi in 2011	Produce inexpensive technology-based learning tool for learning the physics of heat radiation material and the hydrostatic pressure accompanied by LKS	Using the methods of research and development refers to the Education Research and Introduction of Borg and Gall, that the media development of procedures of product development and testing of products in practice instructional internal test (product as a medium of learning) is done without separating the test specifications and test product quality	• Create media props	• Use props cheap technology-based learning materials heat radiation and hydrostatic pressure. • To improve the understanding of the concept
2	Research and development conducted by Emilia Novita 2014	Product props system simulator of the heart	Using research methods Research and Development, design models Borg and Gall	• Create media props	• Development of props on the material using props Circulatory system simulator IPA work heart • To improve the understanding of the concept
3	Media research and	Miniature produce props	Using the methods of	• Creating	• Use props savonius

	learning methods performed by RuzitaSumiati and AidilZamri in 2013	Wind Turbine Generators	experimental research study that observed causal to find data in a process through experimentation so as to determine the effect of the amount of the corner of the wind turbine performance.	miniature props	miniature wind turbines. • To improve the understanding of the concep

Based on previous studies above show their research development learning medium of knowledge of nature by using media props simple so it supports and provides a reference for researchers to develop media props, but no studies have developed a medium of learning science Miniature Wind Power Plant On theme always save energy to enhance understanding of concept. In addition, differences in this study with previous studies is that the object and type of different props on the study.

I. Systematics research

Systematic discussion in research development is divided into six chapters, each chapter has sub chapters.

The first chapter, suggests preliminary descriptions of the background of the problem, problem of the research, the purpose of research and development, the benefits of development, the product specification developed, assumptions and limitations of the development, definition of key term, previous of research, and systematics research.

The second chapter, contains a literature review that discusses previous studies comprised a literature review, the study of the theory which consists of: the nature of natural science (IPA), the nature of instructional media, an overview of the energy, and the understanding of the concept.

The third chapter, contains the design development method describes a simplified development, the development procedure, population and sample, the validity, testing products, the design of the trial, the subject of the trial, the type of data, instruments data collection, and data analysis techniques.

The fourth chapter, contains the results of the development of exposure is description of the media props results development and presentation of data obtained through the expert content test subjects, test expert instructional design teachers, test subjects and field trials.

The fifth chapter, contains a discussion of the analysis of the development of media props, analysis of the results of expert validation, analysis of the attractiveness of the level of media props and analyzes differences in the use of props.

The sixth chapter, is the final part of the thesis which includes the conclusion of the results of the development of the media props and Compact Disk usage instructions and advice in the form of suggestions of utilization and suggestions of further product development.

At the end there isa bibliographyused for references and appendices theories that support the report.

CHAPTER II

REVIEW OF THE LITERATURE

In this chapter will be discussed, (a) Literature review, (b) Theory Study 1) Nature of the natural sciences , 2) The nature of the learning media, 3) overview of energy. Exposure to more information as follows:

A. Review Literature

Research on the development of the media props has a lot to do. Some previous research related on the above research include:

1. Research Development conducted by SiskaDewi in 2011 with the title "Development of Technology Based Learning Viewer Tool Offers Heat Radiation Material And Hydrostatic Pressure". The theory of Constructivism theory is used i.e. students can think to solve the problem, looking for ideas and make decisions. Students will better understand because they are directly involved in building new knowledge, they will be more familiar and capable of apply them in all situations. In addition the students directly involved with active, they will remember the longer all concepts. Such research produce cheap technology based props for learning the physics of heat radiation material and the hydrostatic pressure is accompanied with LKS.[19]

[19]Siska Dewi, " Pengembangan Alat Peraga Pembelajaran Berbasis Teknologi Murah Materi Radiasi Kalor Dan Tekanan Hidrostatik". "*Skripsi".* (Lampung; Program Studi Pendidikan Fisika Universitas Lampung, 2011

2. Development Research conducted by EmyliaNovita in 2014 under the title "development of Props Simulator IPA to enhance the understanding of the concept of matter work system the heart of class V in MIN DarulUlumRejosoJombang". The theory is the theory bloom taxonomy so that the IPA is expected to provide knowledge (cognitive), which is the primary purpose of learning. The type of the specified knowledge is a basic knowledge of the principles and materials that are useful for everyday life. In the form of facts in order to understand and deepen knowledge further. Such research produces the products props simulator system working heart in its aim to improve the understanding of the concept of the work system of the heart.[20]
3. Research media and learning methods performed by RuzitaSumiati and AidilZamri in 2013 with the title "Design of Wind Turbine Power Plant Miniature Media Learning". The basic theory used is the theory of Faraday namely if a conductor is moved in a magnetic field, then both ends of the conductor will ariseinduction electromotive force. The study resulted in products props Miniature Wind Turbine Power Plant Learning Media.[21]

[20]Emylia Novita, F," Pengembangan Alat Peraga Simulator IPA "UntukMeningkatkanPemahamanKonsepMateriSistemKerjaJantungkelas V di MIN DarulUlumRejosoJombang". *"Skripsi*". (Malang: Program Studi Pendidikan Guru Madrasah Ibtidaiyah UIN Malang, 2014)

[21]Ruzita Sumiati dan Aidil Zamri,"Rancang Bangun Miniatur Turbin Angin Pembangkit Listrik Media Pembelajaran". *"Jurnal Teknik Mesin*". (Padang: Program Studi Teknik Mesin Politeknik Negeri Padang, 2013)

B. Theory Studies

1. Nature of Natural Science

a. Definition Natural Science

Natural Science is a part of science which was originally derived from the English "science". The word "science" itself comes from the Latin "scientia" which means I know. While literally the natural sciences or science is the study of the universe, objects that exist on the surface of the earth, in the belly of the earth and space, both can be observed by the senses or not observable by the senses. According to Fowler H.W IPA is a systematic and formulated knowledge, which is associated with symptoms of material that is based on experience and deduction.[22]

Referring to the above explanation can be concluded that the IPA is a natural science that systematically learn about the events that occur in nature which are formulated with specific ways related symptoms and interrelated material between the way the other way.

In essence, the natural sciences include four main elements are:

1) Attitude is a sense of wanting to know about objects, natural phenomena, living things as well as the causal relationships give rise to new problems and can be solved through the correct procedures.
2) The process is problem solving procedures through scientific methods which include preparation of hypothesis, design, experimentation, evaluation, measurement and conclusion.

[22]Trianto, *Model Pembelajaran Terpadu* (Jakarta:Bumi Aksara, 2010), hlm.136

3) Products in the form of facts, principles, theories and laws.

4) Application means the application of scientific methods and concepts of science in everyday life.

b. Function of Learning Science SD/MI

Studied natural sciences in MI has a function as follows:

1) Increase the curiosity and awareness of different types of natural environment and the built environment in relation to their use in everyday life.
2) Develop a process skill that increases problem-solving skills through *doing science.*
3) Developing the ability to apply science and technology, as well as life skills and to continue to the a higher level.
4) Develop knowledge, attitudes, values that are useful for everyday life and the relation with the advancement of science and technology, the environment as well as their use for everyday life.[23]

c. The Purpose of Learning the IPA SD/MI

The subjects of natural sciences aims so that learners have the ability as follows:

1) Obtain confidence in the truth of God Almighty is based on the existence, beauty, order the creatures of nature and its creation.

[23]Usman Samawoto, *Bagaimana Membelajarkan IPA di Sekolah Dasar*, (Jakarta, Depdiknas DIKTI Direktorat Ketenagaan, 2006), hlm. 102

2) Develop knowledge and understanding of materials science that are useful and can be applied in everyday life.
3) Develop a curiosity, a positive attitude and awareness about their relationship interplay between science, environment, technology and society.
4) Develop skills to investigate the process of of nature around, solve problems and make decisions.
5) Increase awareness to play a role in preserving, maintaining and preserving the environment.
6) Increase the awareness to appreciate nature and all its regularity as one of his creations.
7) Obtain a stock of knowledge, concepts and skills of science as a basis for continue their education to SMP / MTs.[24]

d. The Scope of Learning IPA SD/MI

Scope of the study material IPA for SD / MI includes the following aspects:

1) Living beings and life processes, namely humans, animals, plants, and their interaction with the environment, and health.
2) Object/material, its properties include the following: liquid, solid, and gas.
3) Energy and changes include: the style, sound, heat, magnetic, electricity, light and simple aircraft.

[24]*Peraturan Menteri Pendidikan Nasional Republik Indonesia* Nomor 22 Tahun 2006 Tentang Standart Isi untuk Satuan Pendidikan Dasar dan Menengah (Jakarta: BSNP, 2006), hlm. 162

4) The earth and the universe include: the land, the earth, the solar system, and other objects.[25]

e. Understanding the concept

From the treasury of science there are theories as IPA product. By theory, can be built with an explanation or prediction that will occur in the future, then by empirical testing through observation or experiment, obtained generalizations that can complement (strengthen, revise or reject) the theory that previously existed in the realm of science.

According to this view, IPA consists of a variety of skills or skills researching process of, which consists of basic process skills and integrated process skills. It covers basic process skills of observing, measuring, communicating, classifying. Meanwhile integrated process skills include designing experiments, formulate hypotheses, conduct experiments, draw conclusions.[26]

Natural Sciences as a product composed of law, principles, procedures theories, concepts, facts, and information. The concept is the smallest component of building science. The concept of building theories, laws, principles or procedures. The concept is a product of the scientific process.

Understanding the concept is expected proficiency levels students are able to understand the concepts, situations and facts that are known, and can be

[25]*Ibid*, 162

[26]Muslimin Ibrahim," *Konsep, Miskonsepsi dan Cara Pembelajarannya*". (Surabaya: Penerbit Unesa University Press 2012). hlm 2-3

explained by his own words in accordance with their knowledge, with no change in meaning.[27]

2. Nature of Learning Media

a. Concept of the Learning Media

The word media comes from the Latin medius, which literally means "middle, intermediate or introductory". In Arabic, the media is an intermediary or an introductory message from the sender to the receiver. According to Gerlach and Ely said that if understood broadly, the media is the human, material, or events that build a state or enable the pupils to acquire knowledge, skills or attitudes. In this sense, teachers, books, text, and the school environment is the media. More specifically, the notion of media in teaching and learning tends to be interpreted as graphics tools, photographic, or electronically to capture, process, and reconstruct the visual and verbal information.[28]

In simple terms can be defined as an intermediary media or conductor. While the term learning is a condition to make someone do learning activities. According to Briggs, said the media is all the physical vehicle or physical device that can present the message sert stimulate learners to learn.[29]And according to HamidjojoLatuheru, learning media is a tool that can help the

[27]Purwanto, *Prinsip-prinsipdanteknikevaluasipembelajaranpendidikan*, (Bandung: Rosdakarya, 2008), hlm.11

[28]Cecep Kustandi dan Bambang Sutjipto," *Media Pembelajaran*". (Bogor: Penerbit Ghalia Indonesia, 2011), hlm. 7-8

[29]Arief S. Sudirman, "*Media Pendidikan, Pengertian, Pengembangan dan Pemanfaatannya"*. (Jakarta: CV. Rajawali, 1990), hlm. 8

learning process and serves to clarify the meaning of the message, so as to achieve the learning objectives with better and perfect.[30]

Science and technology development increasingly encourage reform efforts in utilizing the results of technology in the learning process.[31]Technological developments have greatly affects the use of the media, as a tool in the learning process. Learning media is a tool that serves and is used to convey the message. Progress and the role of technology is so prominent, so the use of teaching aids, aids educational aids, audio, visual, and audio-visual equipment and school supplies as well as other working equipment, adapted to these developments.[32]But to note is that all school equipment and school supplies must be adapted to the demands of the curriculum with materials, methods, and levels of learners (students) to achieve the learning objectives.[33]

Many restriction or sense suggested by experts on media, among which are: the Association of Communication Technology and Education (Association of Education and Communication Technology (AECT) in the United States, limiting the media as all forms and channels that people use to convey the message or information.[34]

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[30]Cecep Kustandi dan Bambang Sutjipto, *Op.Cit*, hlm. 9

[31]Ibid, hlm, 7

[32]Oemar Hamalik, *"Media Pendidikan"*. (Bandung: PT. Citra Aditya Bakti,1989), hlm.3

[33]Hujair AH. Sakany, "*Media Pembelajaran"* . (Yogyakarta: Penerbit Safiria Insania Press Indonesia, 2009), hlm. 2

[34]Ibid, hlm. 3

b. Purpose of the Learning Media

The purpose of the learning media as learning tools, are as follows:[35]

1) Simplify the learning process in the classroom.
2) Improving the efficiency of the learning process.
3) Keep the relevance of the subject matter with the purpose of learning, and
4) Helps the concentration of learners (students) in the learning process.

c. Benefits of Media in Learning

In general, media education has utilities as follows:[36]

1) Clarify the presentation of the message in order not to be verbal (in the form of words written or spoken sheer).
2) Overcoming the limitations of space, time and mains senses, such as:
    a) Objects that are too large can be replaced with reality, image, movie frames, movie, or model.
    b) Objects are small helped by micro projectors, movie frames, movies, or pictures.
    c) The motion that are too slow or are too fast, can be helped by *time lapse* or *high speed photography.*
    d) Event or events that happened in the past can be played back through the film footage, video, movie frames, photos and herbal.
    e) Objects that are too complex (for example machines) can be presented with models, diagrams, and others.

[35]Ibid, hlm. 4
[36]Arief S. Sadiman, dkk. " *Media Pendidikan*". (Jakarta: Rajawali, 1990), hlm. 16-17

f) The concept is too broad (volcanoes, earthquakes, climate, etc.) can be visualized in the form of a film, the film frames, images and others.

3) By using the appropriate media and varied education can overcome the passive of students. In this case the educational media is useful for:

a) Stimulating learning.

b) Allow more direct interaction between students with the environment and reality.

c) Allow students to learn individually according to their ability and interest.

4) With the unique nature of each student coupled with the environment and a different experience, while the curriculum and educational materials are determined the same for each student, the teacher will be fraught with difficulties when they should be solved themselves. If the environmental background of teachers and students is also different. This problem can be overcome by education media, that is the ability to:

a) Provide the same stimulus.

b) To liken the experience.

c) Raises the same perception

d. Benefits of media in teaching and learning

The benefits of media in teaching and learning, among others:[37]

1) Increase the student's motivation to learn something / excite learning

2) Increasing levels of activeness / student engagement in learning activities.

3) Helping to accelerate the understanding of the learning process.

[37]Pupuh Fathurrohman, " Strategi Belajar Mengajar". (Bandung: Refika Aditama, 2007), hlm. 67

4) Learning more communicative and productive.
5) Learning media can clarify the presentation of the message information so as to facilitate and enhance the learning process and result.
6) Learning media can overcome the limitations of the senses, space, and time.
7) Media can provide a common experience of learning to students about environmental events in their environment, as well as allowing the interaction directly with teachers, community, and environment ex: through field trips, visits to museums or the zoo.[38]

e. Kinds of Learning Media

In terms of educational technology, media or materials as a source of learning is a component of the instructional system in addition to the message, people, and equipment engineering background. Understanding this medium is still often confused with the equipment. Media or material is software (software) containing messages or educational information is usually presented using the equipment. While the equipment or hardware it self is advice to be able to display the messages contained on the media.[39]

Many efforts have been made by experts to identify the types of instructional media. There is a view of the physical aspect and nothing to look at from the aspect of the five senses. The division of media types and characteristics of learning as follows:[40]

[38]Azhar Arsyad, Media Pembelajaran, (Jakarta: RajaGrafindo, 1997), hlm. 26-27
[39]Ibid, hlm. 19
[40]Hujair AH. Sakany, "*Media Pembelajaran"* . (Yogyakarta: Penerbit Safiria Insania Press Indonesia, 2009), hlm. 39-40

1) Instructional media, in terms of the aspects of physical form, by dividing the types and characteristics, as follows:
   a) Electronic media, such as television, film, radio, slides, video, VCD, DVD, LCD, computers, internet, etc.
   b) Non electronic media, such as books, handouts, modules, dictates, graphic media, and props.
2) Anyone seen from the aspect of the senses by dividing into three, namely:
   a) Audio Media (listen)
   b) Visual Media (seeing), including graphic media[41]
   c) Audio Visual Media (hear-see)
3) Anyone seen from the aspect of the tools and materials used, namely:
   a) Tool (hardware) as a means of displaying the message
   b) Software, as a message or information.

f. The Concept of Props

One purpose of learning of Natural Science (IPA) is to enable students to understand science concepts related to everyday life. Each object that can explain an idea, a principle, symptoms or natural law can be called props. If the terms of the function of props is to visualize something that is not visible or difficult to see, until the obvious and create an understanding or improve a person's perception.[42]

[41]Tim Dosen FIP-IKIP YK, *" Bacaan wajib, Media Pembelajaran, Dikta".* (Yogyakarta:FIP-IKIP), hlm. 6

[42]R.M. Soelarko, *Audio Visual Media Komunikasi Ilmiah Pendidikan*, (Binacipta), hlm.6

In addition to the above understanding, props can be interpreted as a tool that can be absorbed by the eyes and ears with the goal of helping teachers so that students' learning process more effective and efficient.[43]

In the process of teaching and learning activities should educators determine props appropriate to the learning objectives. The function of props in teaching and learning, among others:[44]

1) The use props in the learning process is not an additional function but has its own function as tools to achieve effective teaching and learning situation.
2) The use of props is an integral part of the overall learning situation.
3) The use of props in learning integral to the purpose and content of the lessons.
4) Props in learning is not merely an entertainment tool or not just a complement.
5) Props in learning more in priority to accelerate the learning process and help students in grasping the meaning of the teacher. The use props in precedence to enhance the quality of teaching and learning.

Based on the terms of the function of these tools, the props can be divided into three, namely:[45]

[43]Sudjana, Media Pengajaran. (Bandunng: Sinarbaru algesindo, 2002), hlm. 9

[44]Nana Sudjana, *Dasar-Dasar Proses Belajar Mengajar*, (Bandung: Sinar Baru Algensindo, 2002), hlm. 99-100

[45]Hujair AH. Sakany, *Op. Cit* ., hlm. 20-21

1) Props directly, ex: teachers explained by showing the real things. These objects can be brought into the classroom, or learners (students) are invited to the location where it was located or tools.
2) Props indirectly, that teachers hold a replacement to the real thing (or miniature mock objects, films, slides, photographs, drawings, sketches or chart) in the classroom.
3) Props or demonstration, in the form of acts or activities carried teacher educators. Example: if a teaching tool to explain how the exercise, prayer, ablution, thawaf, reading, and so on, then teachers need not use props, but the teacher directly demonstrate such actions in the classroom.

3. Theoretical Review on Energy

a. Definition of Energy

Energy is a word that is produced from the Yunani, namely ergon meaning work.[46] Unit to measure the amount of energy according to the International Standard (SI) is the Joule (J). There is a framework of energy that became known as the laws of thermodynamics. The law reads, "Energy is eternal, can not be created, nor can be destroyed, but only transformed from one form to another form". However, basically the sense of energy in the opinion of the experts is as follows:

[46]http://manfaat-it.blogspot.com/2014/01/tentang-pengertian-energi.html. (Diakses pada tanggal 22 Mei 2015, pukul 6.17)

- Campbell, Reece and Mitchell argued that the definition of energy is the ability to rearrange the material. In summary energy is the capacity or ability to carry out work.
- Michael J. Moran argues that energy is the basic concept of thermodynamics which became one of the important aspects of technical analysis.
- Young gives his ideas on energy. According to him, the work is the energy that has been generated. This translates to an energy needed work.
- Unlike the other sense, Einstein uses the application of a formula suggested that energy is the product of mass and the square of the speed of light.

From the above understanding, according to experts it can be concluded that the energy (power) is defined as the ability to conduct business (work).[47] Without energy, the world will live or frozen. In human life is always going activities and the energy required for muscle activity. That energy is obtained through the process of oxidation (burning) of nutrients that enter the body with food. Other human activities in producing goods and transportation and others also require energy from the energy source material is often called natural resources (natural resources).[48]

b. Various Forms of Energy

[47]Asan Damanik, *" Fisika Energi*". (Jogyakarta: Universitas Sanata Dharma, 2011), hlm.21

[48]Maskoeri Jasin, " Ilmu Alamiah Dasar". (Jakarta: PT. Raja Grafindo Persada, 1993), hlm. 69

After discussing the idea of energy, this time will be explained about the various forms of energy known to man including the following:[49]

1) Mechanical energy (energy of motion)

The mechanical energy can be divided into two terms, namely potential energy and kinetic energy. The second amount of energy it is called mechanical energy. Each item has a weight, then either at rest or moving any body have the energy. For example, the energy stored in the water dammed in a reservoir is inactive and is called potential energy (energy point). When the reservoir is opened the water flowing profusely, water energy becomes active, the flow of water to the kinetic energy (energy of motion).

Water reservoirs in the example above also has potential energy, because of its location. The higher the location of the water reservoir to the surface of the sea water the greater the potential energy.

2) Electrical Energy

The word itself comes from the electric electron, Yunani word meaning amber. Electricity was discovered by the Yunani philosopher Thales (625-547) more than 2,500 years ago. He found that if an amber rubbed on a piece of fabric, such as silk then dust, straw and feathers will stick to the stone.[50]

[49]Ibid, hlm. 70-76

[50]Andarini Trisnasari," *Rahasia Sains Ensiklopedia Sains untuk Anak*". (Jakarta Timur: Rizky Grafis: 2008), hlm. 50

Electrical energy is a form of energy that is needed mankind in various technological fields paced life-mechanical. Therefore it is not surprising that various forms of energy is transformed into electrical energy forms in order to meet the needs of ever increasing variety and quantity due to the progress of industry and population continues to grow.[51]

Electrical energy is the energy arising from the flow of electrical charges in a conductor that has a certain prisoners. There are different types of tools that can change the shape of the existing energy into electrical energy. The electrical energy generated / raised through a variety of ways. For example: one of the tools that are already popular in the community, namely a power generator. Generator is a tool that can convert mechanical energy into electrical energy (in the form of electrical current). With wind energy is used to drive the windmill.

Usefulness of electric energy in everyday life a lot of which can be felt, especially life in the big cities, even as the lights now in use until far into rural.[52]In addition it can be seen role is, it can be seen energy anything that can generate electrical energy from, for example: To turn on the lights in the houses the electrical energy is converted into light energy, to move the machine, then the electrical energy is converted into mechanical energy, for gilding process, the electrical energy is converted into chemical energy.

[51]Asan Damanik, "Fisika Energi". (Yogyakarta: Universitas Sanata Dharma: 2011), hlm.71
[52]Andarini Trisnasari," *Rahasia Sains Ensiklopedia Sains untuk Anak*". (Jakarta Timur: Rizky Grafis: 2008), hlm. 50

Explain that the electrical energy actually has a major role, both in the domestic life as well in the areas of and others.

3) Light Energy

Light energy is energy generated by electromagnetic waves. An example is when the light from the lamp, the farther we are from the light source the less the effect of light on vision.

In the Al-Qur'an verse 5-6 Yunus Allah said as follows:

هُوَ الَّذِي جَعَلَ الشَّمْسَ ضِيَاءً وَالْقَمَرَ نُورًا وَقَدَّرَهُ مَنَازِلَ لِتَعْلَمُوا عَدَدَ السِّنِيْنَ وَالحِسَابَمَا خَلَقَاللهُ ذَلِكَ إِلاَّ بِالْحَقِّ يُفَصِّلُ الأيَاَتِ لِقَوْمٍ يَعْلَمُونَ(5) إِنَّ فِياخْتِلافِ الْلَيْلِ وَالنَّهَارِ وَمَاخَلَقَ اللهُفِيالسَّمَاوَاتِ وَالْأَرْضِ لَأيَاتٍ لِقَوْمٍ يَتَّقُونَ(6)

Meaning: *"He's the one who makes the sun shine and the moon luminous and set his manzilah-manzilah (places) for the journey of the month, that ye may know the number of years and the reckoning (of time). God did not create this, but with the right. he explained the signs (of his greatness) to people who Knowing* "(QS. Yunus: 5-6)

The verse explains that solar energy has the light energy.

c. Sources Energy

The energy source is everything around us is capable of generating energy. Around us many kinds of sources of energy which can produce various kinds of energy. The energy source can be broadly divided into two groups:[53]

[53] http://www.kopi-ireng.com/2014/09/contoh-sumber-energi.html. (Diakses pada tanggal 27 Mei 2015, pada pukul 8.45 wib)

1) Renewable energy sources or renewable and can be used without the worry of running out. example :

a) Wind

The utilization of wind energy is being intensively done by many countries around the world as an energy source is not limited in number, the utilization of this energy using a wind turbine connected to a generator or turbine to produce electricity.

Wind power is a renewable energy source that is abundant in our country and environment friendly for suppressing emission of CO2, therefore we can obtain cheap electricity from wind energy is not limited.

In the verse al-Qur'an Al-Fatir verse 9, Allah said as follows:

وَٱللَّهُ ٱلَّذِيٓ أَرۡسَلَ ٱلرِّيَٰحَ فَتُثِيرُ سَحَابٗا فَسُقۡنَٰهُ إِلَىٰ بَلَدٖ مَّيِّتٖ فَأَحۡيَيۡنَا بِهِ ٱلۡأَرۡضَ بَعۡدَ مَوۡتِهَاۚ كَذَٰلِكَ ٱلنُّشُورُ ٩

Meaning: *"And Allah is He Who sends the winds; and the winds that stir the clouds, cloud We expel them to a country that is dead, and turn the earth after its death it rains. Such is the Resurrection.*

b) Hydroelectric Power Plant

The energy comes from hydro power has long been in use by humans for being environmentally friendly and also abundant Hydroelectricity or Wind Power is one example of the use of water power for a better life.

c) Wind Power Plant

Wind power plant is a power plant that uses wind as an energy source to produce electrical energy. This generator can convert wind energy into electrical energy using wind turbines or windmills.

2) Renewable Energy sources cannot be

These types of energy sources are limited and can not be updated even if there are renewable but requires a very long time. This energy source is still a major energy source that is widely used though many have switched to using alternative energy sources. Examples of non renewable energy sources are:

a) Source of energy derived from fossil

This energy source may actually be renewed but take up to millions of years, derived from living dead and buried in the ground to millions of years. for example: petroleum, coal.

b) The energy source derived from natural minerals

Natural mineral can be utilized as a source of energy after going through several processes, such as uranium, which can produce nuclear energy.

d. Conversion of Energy

Changing Forms of Energy. Energy can neither be created nor be destroyed, but can only be converted from one form to another. In general, the energy benefits will be seen once transformed into other energy. Forms of energy can be changed. Energy can be transformed from one form to

another.[54]Some forms of energy change is utilized in everyday life. Some of these energy changes are as follows.

1) Changes to the energy of motion into electrical energy

Examples: Father put on a bicycle dynamo Fatimah. Dynamo is mounted near the tire. When using it, before pressing the pedal father dynamo so that it touches the top of the tire. Then the father pedaling so the tire rotates. Rotation of the tire causing a dynamo also rotates. Magnetic dynamo rotates inside the coil. This poses a round magnet electrical energy for powering bicycle lights. In this example there is a change of energy of motion into electricity.[55]

2) Electric motion energy into light energy

For example: When evening Fatimah turn on the lights in his house. By the time the lights on changes electrical energy into light energy.

[54]http://mastugino.blogspot.com/2012/12/perubahan-bentuk-energi.html. (Diakses pada tanggal 27 Mei 2015, pada pukul 9.07 wib)

[55]Andarini Trisnasari," *Rahasia Sains Ensiklopedia Sains untuk Anak*". (Jakarta Timur: Rizky Grafis: 2008), hlm. 34

CHAPTER III

RESEARCH METHODS

In this chapter will discuss, (a) Development of method, (b) The development procedure, (c) Population and sample, (d) The validity (e) Testing products, (f) The design of the trial, (g) The subject of the trial (h) The type of data, (i) The data collection instruments, and (j) Data analysis techniques. Expose more as follows:

A. Development of Method

The method used in this study is a research method development or *Research and Development (R & D)*. The model will be developed is referring to the research model *development* or *Research and Development (R & D)* from Borg and Gall which is a strategy for developing effective educational products that can be used to overcome learning problems.[56]In this study developed a miniature props Wind Power Plant is needed thorough planning and preparation.

The design of the development of the design model *research and development (R & D)* adopted by researchers in developing their products, there are 6 steps of development, such as: (1) Stage of research and collection of information on the development of props miniature wind power plant in the theme always save energy, (2) The planning stage of the development of props

[56]Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*, (Bandung: Alfabeta, 2011), hlm. 297

miniature Wind Power in the theme always save energy, (3) Stage of product development props miniature Wind Power in the theme always save energy, (4) Validation Products, (5) Phase revision of the product, (6) Test the initial field, (7) Phase revision of the second product of the props energy change in the theme always save energy, (8) phase field test end, (9) Phase revision of the final product to the props energy change in the theme always save energy, (10) Dissemination and Implementation.

Borg and Gall's model selection is based on the consideration the development model that is programmed and arranged systematically with steps of preparation and careful planning. So that researchers adopt as development steps as in the following below:

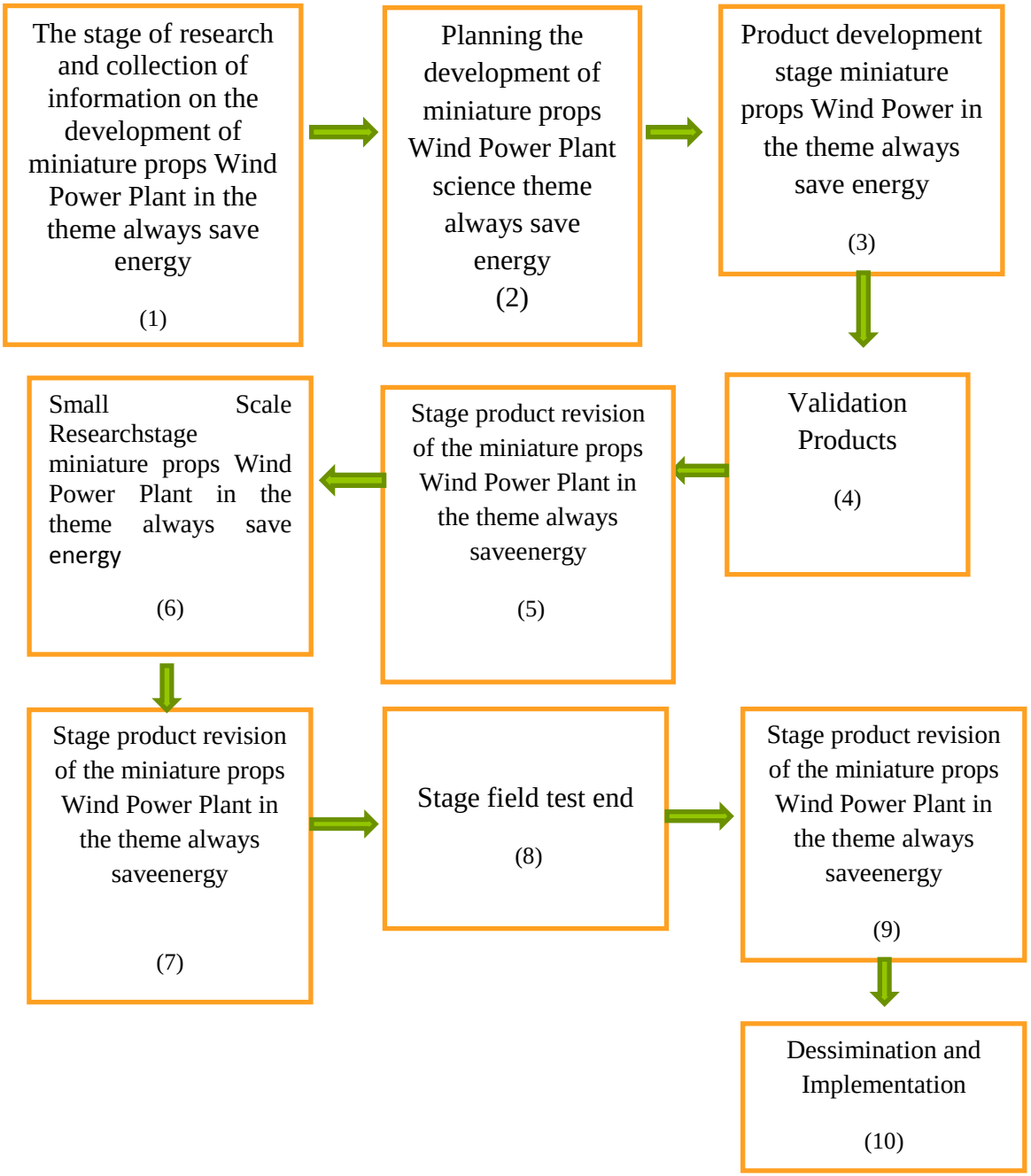

CHART 3.1

Model design R & D Borg and Gall

As for product development in this study only up to the stage to produce the final product, which props the energy change in the theme always save energy that is packed using recycled materials.

B. Development Procedure

Props energy change was developed using some of the development stage of which includes the preliminary study stage *(Research and Information Collecting),* and a research plan *(Planning).* At the preliminary stage consists of the needs analysis stage, library research, small scale research. While the planning stage of the study, consisting of a research and information gathering, planning, product development stage, the stage of beginning field tests, product revision stage, the stage of the final field test.

The explanation above stages of development will be presented as follows:

1. Preliminary Studies

After selecting the problem, then the next step was to hold a preliminary study. As for its descriptions are as follows:

a. Research and Information Collecting

The first step includes needs analysis, the study of the review literature, and small scale research.

b. Needs Analysis

In the development of the props change energy needs analysis performed includes several criteria, that is including the props include products of miniature wind power plant that will be developed is important

for education, and the products props wind power plant miniature allow to develop.

2. Research Planning

a. The planning stage

After doing a preliminary study *(Research and Information Collecting)*The next step is to plan the research. Planning R & D includes formulating the problem, research objectives, hypotheses, choose the approach, as well as determine the source of the data. The planning stages are as follows:

1) Formulate the problem

After a preliminary study on the problems studied, then the next step is to formulate the problem. The formulation of these issues serve to direct the flow of research to make it more focused and centered. The formulation of the issues examined in this study are:

a) How is the results of the development of props media wind power plant miniature on a theme always save energy class 4 to improve the understanding of the concept to material changes in the energy of motion into electricity?

b) What is the effectiveness of media wind power plant miniature to improve understanding of concepts in natural science teaching fourth grade theme always save energy?

c) Is there a different understanding of the concept between fourth grade students who use props media wind power plant miniature with students who do not use props media wind power plant miniature?

2) The Purpose of Research

The research objective one important component in addition to the formulation of the problem. The purpose of research also serves to groove research more focused and concentrated. Part of the purpose of the study can be described as follows:

a) To produce a product in the form of miniature props Wind power plant on subjects natural science fourth grade class theme always save energy.

b) To know the effectiveness of the development of props to enhance the understanding of the concept of learning science theme always save energy through the use of props miniature Wind Power in fourth grade theme always save energy.

c) To know the difference between the concept of understanding the students who use the media props miniature Wind power plant with students who do not use props miniature Wind power plant.

3) Hypothesis

After the researchers examined the various sources to determine the basic assumption, then the next step is to formulate hypotheses. The hypothesis can be interpreted as a temporary answer to the problem until it is proven through the research data collected. The hypothesis in this study can be described as follows:

a) Hypothesis H_1 are:

The difference of understanding of the concept between 4th grade SD Plus Al-Kautsar which uses props wind power plant miniature theme always save energy 4th grade with students who do not use props wind power plant miniature theme always save energy 4th grade in elementary school Plus Al-Kautsar Malang.

b) Hypothesis H_0 are:

There is no difference between students understanding of the concept of the 4th grade SD Plus Al-Kautsar who use props wind power plant miniature theme always save energy 4th grade students who did not use props wind power plant miniature always save energy theme 4th grade at SD Plus Al-Kautsar Malang.

b. Determine the source of data

Source data can be obtained by investigators determine the source of Data or research subjects. In a study Data subjects were students in 4th grade SD Plus Al-Kautsar Malang.

3. Stage of Product Development

The steps of product development props wind power plant miniature on the theme always save energy, including:

a. Determine product design props energy changes that will be developed. The product design props as follows.

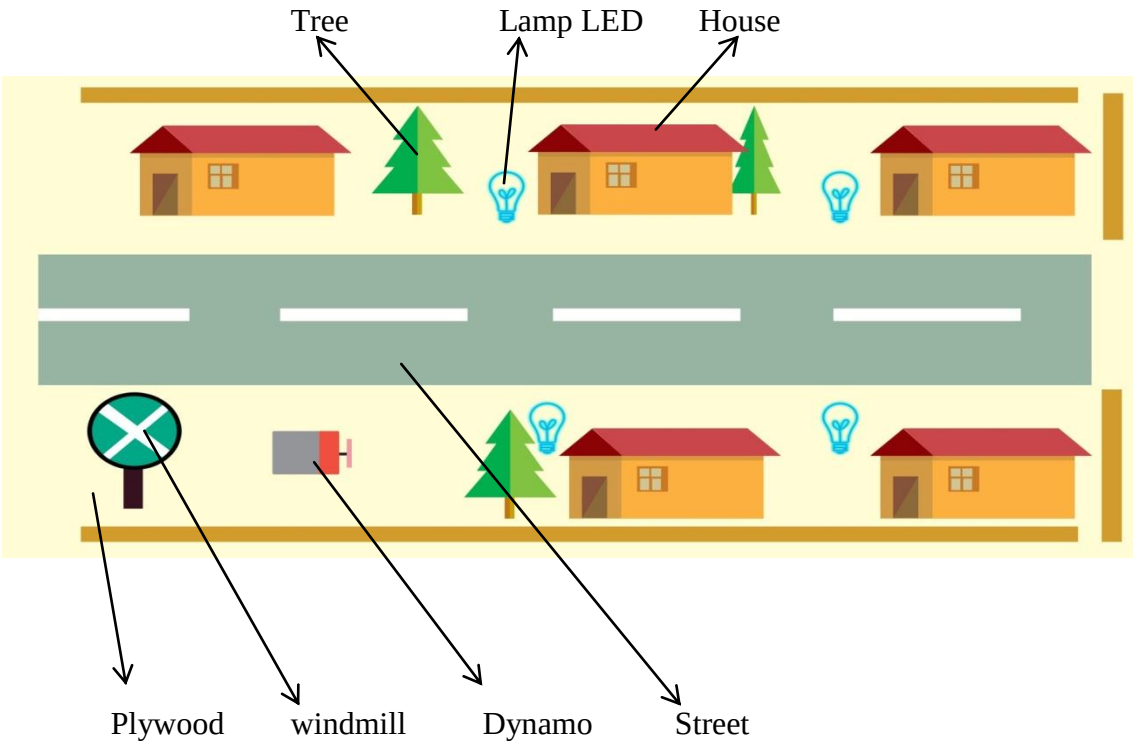

Image 3.I Design Props Wind Power Plant Miniature

Description :

1. Base miniature: Plywood
2. House : Plywood/box
3. Fence : Stick ice cream
4. Dynamo : Dinamo bicycle
5. Windmill : Former fan
6. Lamp : LED
7. Road : Black carton paper
8. Tree : wire and cork

The benefits of such design can facilitate students to learn directly about the changes in motion energy of wind into electrical energy when the wind be moved illustration. Thus the authors designed the props as attractive as possible so that students easily understand.

b. Determine research facilities needed for research and development process, including:

1) Tools and materials props development, namely:

Plywood, paint, cardboard black, saws, LED lights, bicycle dynamo, a former fan, flannel cloth, sponge, wire, solder and tin.

2) Data collection instruments, which include: data collection in this study, the research uses some of data collection instruments, among other pieces of expert validation, questionnaires, interview guides and achievement test.

c. Determines the stages of execution of the test in the field, namely stages the field tests in this study conducted in two stages, including a small group of test phase and final field test. Field tests of a small group is tested on 6 students in the experimental class. While the final field test is a test of the product more widely. This step is aimed to test the effectiveness of the product design miniature props wind power.

4. Stage Validation Product

The next stage is the validation of experts to perfection the manufacture of the product. Before the beginning of the development of products tested field, it must be validated for the feasibility of the substance to be tested, in order to obtain the level of both internal and external validity is quite feasible and justifiable.

Test experts to strengthen and review the initial product and give feedback on the improvement of media expert, content expert field of study and instructional design experts.

Test phase undertaken in the development stage of the consultation is to some experts, feedback and assessment phases, and individual testing. Each step is explained as follows:

1. Stages Of Expert Consultation

At this stage of the consultation of experts consists of several activities consists of:

a. Material experts

1) Lecturer in primary competent in science education
2) Have minimal background S2
3) Understanding the science curriculum SD/MI.

b. Media design

1) Have minimal background S2
2) As a writer of books, papers, and so forth as well as educational observers.
3) Experienced in the design and design book.

c. Learning experts

1) Have minimal background S1
2) Understanding the science curriculum SD/MI.
3) As a teacher who has teaching science for 5 years.

5. Stage revision of the initial product

Products revision in accordance with the input of experts for further tested in a small group.

6. Small Scale Research

In the research development of small scale research is needed to find out some things about the products developed, the energy changes props Natural Sciences (IPA). This step is a limited production test. These measures include among others:

a) Conduct field tests of small groups to design beginning of product development.
b) Are limited, experimental class represented 15 students.
c) Beginning of field test performed 1 time.

In the research development of small scale research is needed to find out some things about the products developed, the energy changes props Natural Sciences (IPA). In this study, carried out small-scale research by questioning and interviews with teachers and students of SD Plus Al-Kautsar Malang related to the learning theme always save energy Natural Sciences (IPA). The results of this small study, shows that learning the theme of energy saving is always in SD Plus Al-Kautsar Malang seldom use props and if using props, but the teacher does not develop exactly as the book of guidance (package) learning. Thus, the authors are interested in conducting research and development, especially on the theme props always save energy.

7. Product Revision

After a small group trial, the revision of the end of the experiments performed as repair products that have been tested.

8. Field trials end

The field trials conducted with test subjects class 4A and 4B in SD Plus Al-Kautsar Malang.

This step is an improvement model or design based on field tests of a small group. The furnishing product will be made only after a field test small groups. At stage of completion of this beginning of product, a lot more done with a qualitative approach. Evaluation is done more on an evaluation of the process, so that improvements are made to be internal improvement. After revisions in order to improve products, the next step is a field trial research on the subject.

9. Revision of the final product

After testing a large group, then made the final revision of the experiments performed as repair products that have been tested.

10. Dissemination and Implementation

The final result is a product that has resulted from the needs analysis, expert evaluation, small group trial, testing a large group, and the results of experimental products in the form of the development of science learning media miniature wind power plant on the theme always save energy class IV students to understanding of the concept.

C. Population and Sample

1. Population

The population includes not only people but also objects and other objects. The population in this research is the grade 4A and 4B SD Plus Al-Kautsar academic year 2015/2016.

2. Sample

The sample in this study were taken using a sample with purposive sampling techniques, accompanied by specific reasons. Class that used as samples is the recommendation of the teacher of Natural Sciences and is quite representative terms of the number of students and the level of student ability than the other class The sample in this study is a class 4A and 4B.

D. Validity

Guidelines for using the scoring in the validation of a scale of 5, while the scoring criteria used in this study are as follows:

Table 3.2
Scoring criteria used in giving assessment on the Development of Media that was developed

SCORE				
1	2	3	4	5
Very Imprecise	Less Precise	Enough Precise	Precise	Very Precise

After the questionnaire data is converted into the data as a value based on Table 3.2, the next step is to determine the average scores of students. The average score questionnaire with Linkert scale statement, are:[57]

$$\text{nilaiProsentase} = \frac{\sum total\ jawaban}{\sum skor\ ideal} \text{ x } 100\%$$

The ideal score, is determined by the following formula:

$\sum$ *skor ideal = skor tertinggi x jumlah responden x jumlah butir*

Result percentage then interpreted based on the category scale capabilities as follows:[58]

Table 3.3

The average score of the answers to the questionnaire

Percentage%	Category
20-36	Very less
36-52	Less
52-64	Enough
64-84	Good
84-100	Very good

E. Product trials

Product trials aiming to obtain accurate data that is used to make revisions or improvements. Before tested, the product must first be consulted with

[57]Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*, (Bandung: Alfabeta, 2011), hlm. 298

[58]Ibid, 298

several experts covering material and instructional media experts. After going through the consultation phase, the product is addressed and assessed by teachers in Natural Sciences.

F. Trial Design

Design test conducted using descriptive trial design. The design allows the development of descriptive data to obtain quantitative and qualitative data which is very beneficial in the improvement of product development. Furthermore the trial design can generally be described in Table 3.4 as follows:

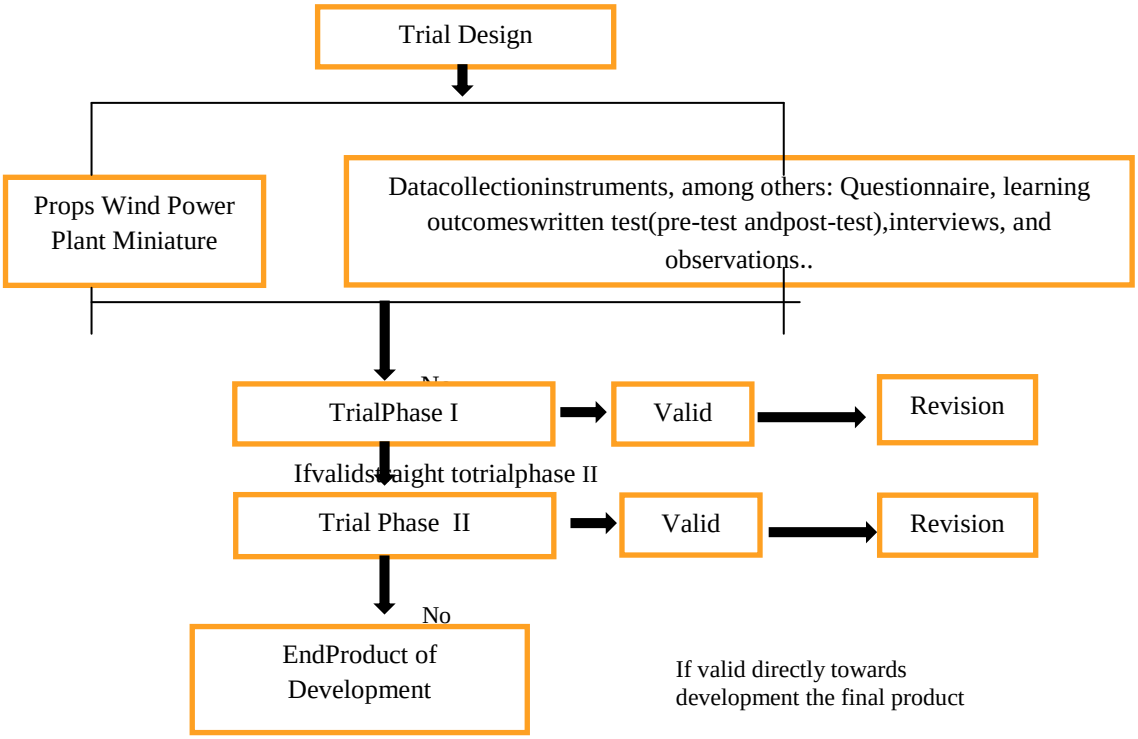

CHART. 3.2
Trial Design Product Development

A good product meets a minimum of two criteria, namely the learning criterion *(instructional criteria)* and performance criteria *(presentation criteria)*. The test is done twice, namely:[59]

1. Limited testing conducted on small groups as users of the product. Small group trial conducted on 6 students. Individual testing consists of the following activities:
   a. Observe the development of students who are learning the theme always save energy by using props miniature wind power plant Natural Sciences class IV and continued with the interview.
   b. Developers perform data analysis observation and interviews.
   c. Developers make improvements props miniature wind power plant Natural Sciences IV class always save energy theme into the final product based on the analysis and feedback, observation data and interviews.
2. Field test, so testing the quality of products developed thoroughly tested empirically and can be responsible. Field test was conducted in the fourth grade students in SD Plus Al-Kautsar Malang.

   Testing was conducted with experiment control group, the first group that will use props miniature power plants Wind power IPA on the theme always save energy is called experiment group, while the group that still use the old teaching methods (conventional) called the control group. Subjects in the experiment class used the technique sampling with purposive sampling, namely

[59]Zainal Arifin, *Penelitian Pendidikan Metode dan Pengembangan Baru*. (Bandung: Remaja Rosdakarya, 2011) hlm. 132

taking the sample members of the population conducted based on specific criteria in that population.

G. Subject of Test

Subject trials in the development of props theme always save energy Natural Sciences IV class are students of class IV A and IV B. Where the subject of a trial class IV A acts as the control class IV and class B as a class experiment. Each test subject class totaled 15 students.

The Selection of SD Plus Al-Kautsar Malang as the test site is based on reason, namely (1) the students have difficulty learning to develop props related to the theme always save energy, and (2) the absence of props Natural Sciences with a model props energy change.

H. Types of Data

Data is defined as information or real material on which to base assessment (analysis and conclusions).[60]Types of data collected customized with the information needed about the products that are developed and learning objectives to be achieved. The data used as a basis for determining the effectiveness, attractiveness of the product. The type of data in the development of these props are quantitative and qualitative data.

1. Quantitative Data

The quantitative data obtained from the assessments given by the trial subject material experts, instructional media expert and teachers of Natural

[60]Wahidmurni. *Cara Mudah Menulis Proposal dan Laporan Penelitian Lapangan; Pendekatan Kualitatif dan Kuantitatif (Skripsi, Thesis dan Disertasi)*. Malang: UM Press, 2008.hlm. 41

Sciences to the props miniature wind power and field trials subject to the props in accordance with the given value.

2. Qualitative Data

The qualitative data obtained from the test subject material experts, instructional media expert and teachers of Natural Sciences in the form of feedback, comments and suggestions on the development of props.

I. Instrument Data Collection

1. Questionnaire

Data analysis techniques in development are aimed at describing all feedback, comments and suggestions of the evaluators obtained from the questionnaire sheet. The steps are conducted in collecting data using questionnaires, among others:

a. Determine indicators of questions that will be listed on the questionnaires.

b. Develop indicators in questionnaires in the form of a question.

c. Categorize questionnaires by using several criteria, namely:

1) Instrument questionnaire used to validate media products miniature wind power, questionnaire instrument used to determine the opinion of learners related to the attractiveness and clarity of media products on the theme of energy changes always save energy.

2) Instrument provides a questionnaire to several experts covering subject material experts, media specialists, teacher of Natural Sciences in fourth grade, and students. The results of the questionnaire instrument

and then analyzed by calculating the average percentage score on every answer to every question in the questionnaire.

Table 3.4
Criteria scoring Used Development in Providing Assessment On Media developed

SCORE				
1	2	3	4	5
Very Imprecise	Less Precise	Enough Precise	Precise	Very Precise

After the questionnaire data is converted into data in the form values based on Table 3.5, the next step is to determine the average scores of students. The average score statement questionnaire with Linkert scale, is:[61]

$$\text{nilaiProsentase} = \frac{\sum total\ jawaban}{\sum skor\ ideal} \times 100\%$$

The ideal score, is determined by the following formula:

$\sum$ *skor ideal = skor tertinggi x jumlah responden x jumlah butir*

Result percentage then interpreted based on the category scale capabilities as follows:[62]

Table 3.5
The average score of the answers to the questionnaire

Value%	Category
20-36	Very less

[61]Sugiyono. *Op. Cit*., hlm. 137
[62]Ibid, 137

36-52	Less
52-64	Enough
64-84	Good
84-100	Very good

2. Observation

The results included one observation data collection instruments used in the training..Observation of activities conducted on during the learning activities and the in progress research activities. The results of observations during the study to be considered in determining the effectiveness of product development. The stages are performed on observation, among others:

a. Observation of activities conducted on the learning activities. This is because the researchers wanted to know how learning and teaching subjects Natural Sciences (IPA) in the SD Plus Al-Kautsar Malang.

b. Observation activities conducted to determine not yet available of facilities and infrastructure that support the learning activities subjects of Natural Sciences (IPA) in the SD Plus Al-Kautsar Malang. For example unavailability props are developed and the limited of learning media image media.

The results of the observation was made of materials evaluation and material input for researchers to improve product development.

3. Interview

Interviews were conducted to obtain research data were not recorded either on questionnaire data and observation. Steps on the activities of the interview is as follows:

a. Make a guidance interview
b. Determine the subjects in the interview, including the fourth grade science class teacher and some students of experiment class and control class related learning activities that took place and the use of media props energy changes on the theme always save energy.

Results of interviews with fourth grade teacher obtained information related to media use energy changes are in accordance with the material always save energy. In addition, the energy change media also developed simple, so learners can provide maximum learning results in a change of energy on the theme always save energy well.

J. Data Analysis Techniques

The data analysis technique is a process to process and interpret data with a function to have a clear meaning and significance according to the research objectives.[63]

The data analysis was conducted by grouping and categorizing data in specified aspects. The result of the grouping linked with other data to get a truth.[64]

[63]Wina Sanjaya, *Penelitian Tindakan Kelas* (Jakarta: Kencana Prenada Media Group, 2009), hlm. 106

[64]Iskandar, *Penelitian Tindakan Kelas* (Jakarta, Gaung Persada Press, 2009), hlm. 108

After grouping and categorizing data in this study a problem of the control group and the experimental group either pretest and posttest were analyzed by t test. The formula unpaired t-test as follows:[65]

$$t_{hitung} = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s^2_{gab}}{n_1} + \frac{s^2_{gab}}{n_2}}}$$

Explanation:

s^2 gab : The combined variance

$\bar{X}_1$: The average value of the control class

$\bar{X}_2$: The average value of the experiment class

n_1 : The number of control group students

n_2 : The number of experiment group students

μ_1 : The average value of population control class

μ_2 : The average value of population experiment class

Analysis of the data using the Test-T will be obtained t_{count} and t_{table}, with $\alpha = 0.05$ means that the confidence level of the 100 samples contained five errors. After analysis and calculation results are known, the next step is to compare the value between t_{count} with t_{table}.

As for determining the level of validity props wind power plant miniature development results of analytical techniques using the following formula analysis:[66]

---

[65]SuntoyoYitnosumarto, *Dasar-dasarStatistika* (Jakarta: PT Raja GrafindoPersada, 1990), hlm. 313

[66]Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2003), hlm. 313

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

Explanation:
P =Precentage

$\sum X_i$ = The total number of scores obtained from the validator

$\sum X$ = Total score ideal

But before the qualitative data that has been collected and analyzed in advance through three stages, namely:[67]

1. *Data Reduction*

   Namely the data reduction, meant to summarize the data obtained, choose things that are fundamental, essential focus, look for themes and patterns. Thus the reduced data will give a clearer picture.

2. *Data Display*

   Presentation of data, conducted in the form of short descriptions, charts and the relationships between categories.

3. *Conclusion Drawing/verification*

   This is the third step that conclusion and verification of the data has been collected and reduced.Data analysis for quantitative data obtained through the questionnaire using a Linkert scale in the form of multiple choice, further processed in a way created percentage formula as the following analysis:[68]

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

Explanation:
P =Precentage

$\sum X_i$ = The total number of scores obtained from the validator

[67]Sugiyono, *Op.Cit*. hlm. 246-253
[68]Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2003), hlm. 313

$\sum X$ = Total score ideal

Whereas the basic and guidelines for determining the validity and basic for a decision to revise the qualification criteria props using ratings as follows:[69]

Table 3.6
The eligibility qualifications based on a percentage of the average

Percentage (%) Rate of validity	Rate of Validity
80-100	Valid / no revision
60-79	Quite valid / no revision
40-59	Less valid / partial revision
0-39	Invalid / revision

Based on the above criteria, props declared valid / no revision if it meets the criteria score of 80 out of all the elements contained in the validation assessment questionnaire includes media experts, subject matter experts, classroom teachers, and students in 4 grade. In this development, props must be made valid criteria. Therefore, the need to revise, if they do not meet the criteria of valid and not a revision.

Ratings achievement test (pretest and posttest) shaped answer questions with 5 multiple choice, short essay 5, and 5 descriptions. Guidelines of multiple choice scoring using the formula correctly multiplied 1. Whereas the a short essay multiplied by 2, and descriptions multiplied by 3. Then add up the value of multiple choice short essay and descriptions and multiplied by 100 divided by 3.

[69]Sugiyono, *Op. Cit.*, hlm. 249-252

CHAPTER IV
RESEARCH RESULT

In this fourth chapter, explained some of the things related to development results. Some of it is such that, a) Description of media development, (b) Presentation of the result data validation experts, (c) Understanding of Concept, (d) Presentation of data the test results (pre-test and post-test). Exposure to more, as follows:

A. Description of media development

In the process of developing these props media required several stages which include:

1. The preliminary study stage to conduct a needs analysis is the most important step to development which collects a variety of information, both from observation, and interviews. This activity is very easy to do because by collecting a variety of information developers can directly find the real conditions in the field. Observations and interviews can be used as an initial step to develop the product.
2. Formulation of the problem and objectives are key things to do before designing a media development. Because the goal setting can be seen direction a product that will be developed.
3. Media development stage props using *Borg and Gall* design models and test phase / validation in the form of instructional media.

Product development of instructional media has done perfecting gradually through validation by subject matter experts Natural Sciences, expert product

design, teacher thematic class IV and targeted use of instructional media product development through small group trial and field trials IV A and IV B SD PlusKautsar Malang.

Description of the results development of miniature props in the form of wind power will be presented the characteristics of the product development. Studies include aspects of product design props and Compact Disk media usage instructions miniature wind power.

Aspects of the design of props consisting of design tools and materials needed as well as ways of making props. The tools and materials needed as well as a way of making more props can be seen below. Props design miniature wind power that has been validated on several experts, are as follows:

Image 4.1
The Results of Development Props

Whereas the aspects of the user video media use props miniature wind power plant consists of the tools / materials, ways of making, and instructions for use.

In the introduction, include the results of the development which includes front cover compact disk, the steps to create a miniature props hydropower (wind), tools and materials, creating and instructions for using the miniature props hydropower (wind), are as follows:

1. Cover For Compact Disk

Image 4.2

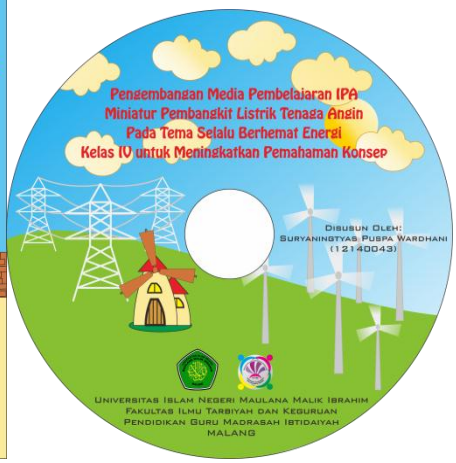

Image 4.3

The front cover arranged to see the design made as attractive as possible to cover basic color is bright and attractive, so that students and the props miniature hydropower (wind) have an interest to understand the procedures for media use props. The front cover consists of the title of the compact disc instructions tailored to the media props namely media props the development of instructional media IPA miniature hydropower (wind), is used for the fourth grade students of SD / MI, the developer name along with student registration number (SuryaningtyasPuspaWardhani. 12140043), the name of the University, Faculty name, the name and logo of the University and its Department of Programs in primary logo.

2. The Rear Cover Compact Disk

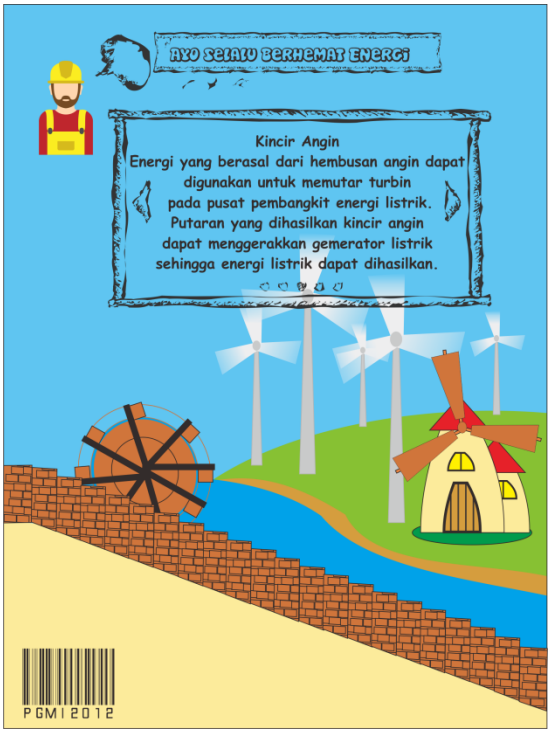

Image 4.4

Cover the rear of a compact disk contains a brief overview or summary of the changes mechanical energy into electrical energy.

3. Content Section

Tools and Materials Making Media Learning hydropower (wind) as follows:

No	Photo	Information
1		1. Flannel fabrics green color 2. Pilox green
2		1. Ruler 2. Solder 3. Chopsticks 4. Pencil 5. Glue G 6. Screwdriver 7. Cable 8. Glue gun

3		1. Tiner 2. Cat brown 3. Paintbrush 4. Dynamo 5. LED lights 6. Rubber and 7. Tin
4		1. Red paint 2. Yellow paint 3. Brown paint 4. Blue paint
5		Sponge that has been given the green color pilox
6		Saw
7		Rajawali Glue
8		Wood for buffering fan

		
9		Spike
10		Former fan
11		Iron that has been bent
12		Plywood

The steps to create media props contains the tools/materials for props miniature hydropower (wind) so that students know the material created to make the media props miniature hydropower (wind) as follows:

a. How to use props wind power plant miniature

Image 4.5

Image 4.6

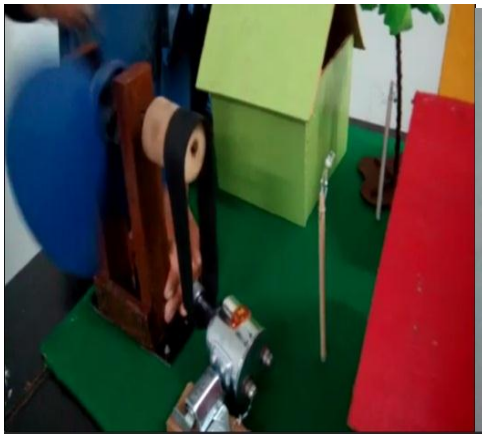

Image 4.7

Image 4.8

How to use props that by turning the fan continuously pedal then the LED lights will light up. Why are the lights on? In these props we will study the concept of energy changes. By the time we turn the pedal fan continuously, then the motion on this dynamo of energy that will change the energy of motion of the fan into electrical energy. Electrical energy can be evidenced by the flaming LED lights.

b. Information About Knowledge

Image 4.9

Image 4.10

Image 4.11

Image 4.12

Image 4.13

Information about their knowledge of the application of wind energy into electrical energy in remote areas, namely in the area of East Sumba

Tanararamcommonly known as sky dancer. Students can determine that renewable energy, and energy can be created with this video.

B. Presentation of the Result Data Validation Experts

Validation media wind power plant miniature conducted by expert validator on the date (March 2, 2016) until (March 21, 2016). The research data media product development conducted in 4 stages. The first phase conducted by professors of physics as a subject matter expert Natural Sciences namely Mrs. DewiAnggraeni, M.Si on the date (March 2, 2016) until (March 9, 2016). The second phase of validation is obtained from the assessment of media development products conducted by a lecturer who is also a lecturer of Government Elementary School Teacher Education (primary education) as a media expert on the date (March 14, 2016) until (March 21, 2016). The third stage is obtained from the assessment of product development done by the media thematic fourth grade teacher as learning experts on March 16, 2016. The fourth stage is obtained from the assessment of small group trial represented by six respondents. Identity validation subject experts and field trials can be seen in the attachment below.

The data obtained are quantitative and qualitative data. Qualitative data derived from the questionnaire assessment using Likert scale, while the quantitative form of additional assessment or the advice of some experts who act as a validator. Data validation test results were analyzed by using the average score on the assessment evaluator assessment items.

1. The Results of Validation Expert Content

Product development is given to the subject matter expert of Natural Sciences is a form of media props miniature wind power. Exposure descriptive results of the validation by subject matter experts on media development products miniature wind power plants to improve the understanding of the concept on the theme always save energy class IV filed through questionnaire method with questionnaires so as to produce quantitative data and qualitative data.

a. Quantitative Data

Quantitative data validation results matter experts can be seen in table 4.1 as follows:

Table 4.1
Results Matter Expert Assessment of Natural Sciences

No	Question	X	X_i	P (%)	The level of validity	Explanation
1	The formulation of the topic on the development of media props miniature hydropower (Wind)	4	5	80	Valid	No Revision
2	Relevance of indicators with basic competence in media props miniature hydropower (Wind)	5	5	100	Very Valid	No Revision
3	The suitability of the material presented in miniature props hydropower (Wind)	5	5	100	Very Valid	No Revision
4	The attractiveness / props suitability with the concept of matter	5	5	100	Very Valid	No Revision
5	The scope of the material presented in accordance with	5	5	100	Very Valid	No Revision

	the purpose of learning					
6	Ease of understanding the material through props	4	5	80	Valid	No Revision
7	Media props miniature hydropower (wind) may be easier for students to understand the material in the study of changes in energy of motion into electrical energy	5	5	100	Very Valid	No Revision
8	Media miniature hydropower (wind) appropriately used in science teaching in particular changes in energy	5	5	100	Very Valid	No Revision
9	The precision of the use of the language used in the instructions for use printed on the compact disk	4	5	80	Valid	No Revision
10	Clarity guide media use props miniature hydropower (wind) on a compact disk	4	5	80	Valid	No Revision
	Total	46	50	92	Very Valid	No Revision

Explanation:

X : Scores validator answers by DewiAnggraeni, M.Si as a subject matter expert

X_i : The highest answer score

P : Percentage level of validity

Response assessment questionnaire filled out by the lecturer of physics as a subject matter expert, calculated the percentage level of validity media props as follows:

$$\text{Prosentase} = \frac{\sum xi}{\sum x} \text{ X } 100\ \%$$

$$=\frac{46}{50} x\ 100\%$$

= 0,92 x 100% = 92%

Results of the assessment of subject matter experts to get the value of 92% has been converted by the qualifying table feasibility level by the average percentage, showed the percentage of achievement of 92% are in the valid qualifications so that the media is not a revision, but on a compact disk needs additional bit. This shows that the media props miniature wind power is good and fit for use based on the results of expert assessment material.

b. Qualitative Data

The qualitative data obtained from feedback, suggestions and comments Natural Sciences subject matter expert in media statements regarding miniature props wind power plants in Table 4.2 as follows:

Table 4.2
Suggestions and Comments Expert Matter to Media Viewer Tool

Name Subject Test Expert	Suggestion / Comments
DewiAnggraeni, M.Si	1. In the video tools and materials for the additional installation of dynamos and installation of lighting circuits. 2. In the video the instructions for use add a prologue about the various energy sources and add applications hydropower (wind) that already exist.

c. Revised Product

Based on the analysis conducted, the revision of the media props are as follows:

Table 4.3
Result Revision Matter Expert Assessment of Natural Sciences

No	Question	X	X_i	P (%)	The level of validity	Explanation
1	The formulation of the topic on the development of media props miniature hydropower (Wind)	5	5	100	Valid	No Revision
2	Relevance of indicators with basic competence in media props miniature hydropower (Wind)	5	5	100	Very Valid	No Revision
3	The suitability of the material presented in miniature props hydropower (Wind)	5	5	100	Very Valid	No Revision
4	The attractiveness / props suitability with the concept of matter	5	5	100	Very Valid	No Revision
5	The scope of the material presented in accordance with the purpose of learning	5	5	100	Very Valid	No Revision
6	Ease of understanding the material through props	5	5	100	Valid	No Revision
7	Media props miniature hydropower (wind) may be easier for students to understand the material in the study of changes in energy of motion into electrical energy	5	5	100	Very Valid	No Revision
8	Media miniature hydropower (wind) appropriately used in science teaching in particular changes in energy	5	5	100	Very Valid	No Revision

9	The precision of the use of the language used in the instructions for use printed on the compact disk	5	5	100	Valid	No Revision
10	Clarity guide media use props miniature hydropower (wind) on a compact disk	4	5	80	Valid	No Revision
	Total	49	50	98	Very Valid	No Revision

Explanation:

X : Scores validator answers by Miss DewiAnggraeni, M.Si as a subject matter expert

X_i : The highest answer score

P : Percentage level of validity

Response assessment questionnaire filled out by the lecturer of physics as a subject matter expert, calculated the percentage level of validity media props as follows:

Prosentase $= \frac{\sum xi}{\sum x} x\ 100\ \%$

$= \frac{49}{50} x\ 100\%$

= 0,98 x 100% = 98%

Results of the assessment of subject matter experts to get the value of 98% has been converted by the qualifying table feasibility level by the average percentage, showed the percentage of achievement of 98% are in the valid qualifications so that the media is not a revision, but on a compact disk needs additional bit. This shows that the media props miniature wind power is good and fit for use based on the results of expert assessment material.

Table 4.4

Frequency Distribution of Matter Expert Level Validation IPA

Level of Validity	F	%
Valid	5	98

Table 4.1 up to 4.4 indicates data validation results matter experts Natural Sciences to product development simulator IPA media to increase understanding of the concept of matter always save energy class IV SD Plus Al-Kautsar is 100% declared invalid, on items 1 through 10.

d. Qualitative Data

The qualitative data obtained from feedback, suggestions and comments Natural Sciences subject matter expert in media statements regarding miniature props wind power plants in Table 4.5 as follows:

Table 4.5

Revision Media Based Validation Expert Content

Name Subject Test Expert	Suggestion / Comments
DewiAnggraeni, M.Si	1. Media is interesting and valid in helping students understand the concept of energy changes. 2. In the application of media in the classroom teachers are expected to provide a preliminary grade of the importance of these wind power plants, so that students have a realistic understanding.

All data assessment and review of expert material Natural Sciences as a basis for the revision of a component for improving the media and the subject matter of Natural Science before the trial a field.

2. Results Validation Expert Learning Media

Products submitted to the development of instructional media expert is in the form of media props miniature wind power. Exposure descriptive results of the validation by subject matter experts on media development products miniature wind power plants to improve the understanding of the concept on the theme always save energy class IV filed through questionnaire method with questionnaires so as to produce quantitative data and qualitative data.

a. Quantitative Data

Quantitative data validation results matter experts can be seen in table 4.6 as follows:

Table 4.6
Results Assessment Expert Media Natural Sciences

No	Question	X	X_i	P (%)	The level of validity	Explanation
1	The attractiveness of the packaging design miniature props hydropower (Wind)	5	5	100	Very Valid	No Revision
2	Clarity illustration props wind power	5	5	100	Very Valid	No Revision
3	The suitability of the use of the colors used in miniature props	4	5	80	Valid	No Revision

	wind power					
4	Suitability home use miniature pedestal and hydropower (wind) in props	4	5	80	Valid	No Revision
5	Suitability support tools miniature hydropower (wind) with material	4	5	80	Valid	No Revision
6	Ease of props hydropower operating system (Wind)	5	5	100	Very Valid	No Revision
7	With props hydropower (Wind) miniature the students can understand the material changes the energy of motion into electrical energy	4	5	80	Valid	No Revision
8	The precision of the layout of the house, lights, trees, dynamo, and fans in miniature props hydropower (Wind)	3	5	60	Quite Valid	No Revision
9	Usage instructions are present in the compact disk	4	5	80	Valid	Valid Revision
10	Video tools and materials making miniature Hydropower (wind) can be understood by students	4	5	80	Valid	No Revision
	Total	42	50	84	Valid	No Revision

Explanation :

X : Scores validator answers by Mr. AgusMuktiWibowo, M.Pd as media expert

X_i : The highest answer score

P : Percentage level of validity

Response assessment questionnaire filled out by the lecturer of physics as a subject media expert, calculated the percentage level of validity media props as follows:

Prosentase $= \frac{\sum xi}{\sum x} \text{ x } 100\%$

Prosentase $= \frac{42}{50} \text{ x } 100\%$

$= 0{,}84 \text{ x } 100\% = 84\%$

Results of the assessment of learning media expert to get the value of 84%. Once converted to the feasibility level of the qualifying table based on the average percentage, showed the percentage of achievement of 84% in the qualification is valid enough so that the media needs to be revised. However, there is one item that is a component suitability of the use of colors on props, the two components need to be revised and the revision submitted to the expert instructional media for tested again to valid. The results of the validation study media after being revised are presented in the table. 4.7.

Table 4.7

Frequency Distribution of Media Expert Level Validation IPA

Level of Validity	**F**	**%**
Valid	9	Valid
Quite Valid	1	84

In Table 4.6 and 4.7 show the results of a media expert validation for the product development of miniature media hydropower (wind) to improve the

understanding of the concept on the theme always save energy 84% of fourth grade is declared valid, the instrument on items 1,2,3,4,5, 6,7,9, and 10. Meanwhile, 10% stated they were quite valid, that the instrument 8. Looking at the results of validation is still the percentage of 10% declared valid enough that the precision of the component layout of the house, lights, trees, dynamo, and a fan in the tools miniature props hydropower (wind) needs to be revised and submitted to the instructional media for tested again validation.

b. Qualitative Data

The qualitative data obtained from the input, suggestion and media expert commentary Natural Sciences in a statement regarding the media props miniature wind power plants in Table 4.8 as follows:

Tabel 4.8
Suggestions and Comments Media Expert to Media Viewer Tool

Name Subject Test Expert	Suggestions/Comments
AgusMuktiWibowo, M.Pd	1. The layout of the installation of the lights repaired

c. Revision Product

Based on the analysis performed, the revision of the media props are as follows:

Table 4.9
Results Revision Media Expert Assessment of Natural Sciences

No	Question	X	X_i	P(%)	The level of validity	Explanation
1	The attractiveness of the packaging design miniature props hydropower (Wind)	5	5	100	Very Valid	No Revision
2	Clarity illustration props wind power	5	5	100	Very Valid	No Revision
3	The suitability of the use of the colors used in miniature props wind power	5	5	100	Very Valid	No Revision
4	Suitability home use base miniature and hydropower (wind) in props	5	5	1000	Very Valid	No Revision
5	Suitability support tools miniature hydropower (wind) with material	5	5	100	Very Valid	No Revision
6	Ease of props hydropower operating system (Wind)	5	5	100	Very Valid	No Revision
7	With props hydropower (Wind) miniature the students can understand the material changes the energy of motion into electrical energy	4	5	80	Valid	No Revision
8	The precision of the layout of the house, lights, trees, dynamo, and fans in miniature props hydropower (Wind)	4	5	80	Valid	No Revision

9	Usage instructions are present in the compact disk	4	5	80	Valid	Valid Revision
10	Video tools and materials making miniature Hydropower (wind) can be understood by students	5	5	100	Very Valid	No Revision
	Total	47	50	94	Very Valid	No Revision

Explanation :

X : Scores validator answers by Mr. AgusMuktiWibowo, M.Pd as media expert

X_i : The highest answer score

P : Percentage level of validity

Response assessment questionnaire filled out by the lecturer of physics as a subject media expert, calculated the percentage level of validity media props as follows:

$$\text{Prosentase} = \frac{\sum xi}{\sum x} \text{ x } 100\%$$

$$\text{Prosentase} = \frac{47}{50} \text{ x } 100\%$$

$$= 0{,}94 \text{ x } 100\% = 94\%$$

Results of the assessment of media experts to get the value of 94% has been converted by the qualifying table feasibility level by the average percentage, showed the percentage of achievement of 94% are in the valid qualifications so that the media is not a revision. This shows that the media props miniature hydropower (wind) is good and fit for use based on the results of expert assessment of the media.

Table 4.10

Frequency Distribution of Matter Expert Level Validation IPA

Level of Validity	F	%
Valid	5	94

Table 4.10 shows data from media expert validation of Natural Sciences to product development simulator IPA media to increase understanding of the concept of matter always save energy class IV SD Plus Al-Kautsar is 100% declared valid, on items 1 through 10. The results of the validation study media after revised is presented in the table. 4.9.

d. Qualitative Data

The qualitative data obtained from the input, advice and media expert commentary Natural Sciences in a statement regarding the media props miniature wind power plants in Table 4.11 as follows:

Table 4.11

Result Suggestions and Comments Expert Matter to Media Viewer Tool

Name Subject Test Expert	Suggestions/Comments
AgusMuktiWibowo, M.Pd	1. Can be used research

All data from the review, the expert assessment of learning media as a basis for revising the design for improving media props or compact disk before been tested on learners to product development.

3. The Results Of The Validation Teacher Thematic Class IV SD Plus Al-Kautsar Malang

Product development is given to teachers is a form of media thematic props miniature hydropower (wind). Exposure descriptive results of the validation by subject matter experts on media development products miniature wind power plants to improve the understanding of the concept on the theme always save energy class IV filed through questionnaire method with questionnaires so as to produce quantitative data and qualitative data.

a. Quantitative Data

Quantitative data validation results matter experts can be seen at 4.12 the following table:

Table 4.12
The Results Of The Assessment Against The Media Thematic Teacher

No	Question	X	X_i	P (%)	The level of validity	Explanation
1	Media props miniature hydropower (wind) can facilitate students in learning activities	5	5	100	Very Valid	No Revision
2	The media props miniature Hydropower (wind) used in learning the IPA especially in energy and material changes (motion into electricity)	5	5	100	Very Valid	No Revision
3	Clarity media exposure of the material in miniature hydropower (wind)	5	5	100	Very Valid	No Revision
4	The scope of the material presented in the props in accordance with the purpose of	4	5	80	Valid	No Revision

	learning					
5	Media props miniature hydropower (wind) in accordance with the material	4	5	80	Valid	No revision
6	By using miniature props media hydropower (wind) students can be motivated in the following study	5	5	100	Very Valid	No Revision
7	Media props miniature hydropower (wind) can help students understand the material	4	5	80	Valid	No Revision
8	Media miniature hydropower (wind) can improve the understanding of the concept of matter changes wind energy into motion energy	5	5	100	Very Valid	No Revision
	Total	37	40	92,5	Very Valid	No Revision

Explanation :

X : Scores validator answers by RirinKusmiati, S.Pd as teachers thematic SD Plus Al-Kautsar Malang

X_i : The highest answer score

P : Percentage level of validity

Based on the assessment questionnaire response assessment questionnaires filled out by lecturers media expert and lecturer in primary as learning experts, can be calculated percentage of the level of validity media visual style as follows:

Prosentase $= \frac{\sum xi}{\sum x} x\ 100\%$

Prosentase $= \frac{37}{40} x\ 100\%$

= 0,925 x 100% = 92,5%

Results of the assessment of teachers thematic SD Plus Al-Kautsar get a value of 92.5%. After conversion to the feasibility level of the qualifying table based on the average percentage, showed the percentage of achievement of 92.5% are in the valid qualifications so that the media or compact disk usage instructions do not need to be revised, just need additional instructions on the label only props. This shows that the media props miniature hydropower (wind) on the theme always save energy is good and fit for use based on the results of assessment of subject teachers Natural Sciences Class IV SD Plus Al-Kautsar Malang.

Table 4.13
Frequency Distribution Level Validation Teacher Natural Sciences Field Studies Class IV

The level of validity	F	%
Valid	10	92,5

b. Qualitative Data

The qualitative data obtained from feedback, suggestions and comments from teachers thematic SD Plus Al-Kautsar in a statement regarding the media props miniature wind power plants in Table 4.14 as follows:

Table 4.14
Result Suggestions and Comments Expert Matter to Media Viewer Tool

Name Subject Test Expert	Suggestions/Comments
RirinKusmiati, S.Pd	1. Give instructions in the tool to make it easier to understand the more children use the appliance

C. Understanding the concept of Students Regarding Use Media Wind Power Plant Miniature

Product development was tested in grade IV SD Plus Al-Kautsar Malang on 5 April 2016 to 7 April 2016. Testing was conducted in the fourth grade as the control class A and class IV B as an experimental class. Product development trials submitted to field development which include:

1. Small field trials

This small group trial represented 6 respondents to the criteria of the correspondent is 2 correspondent top, 2 middle and 2 correspondent bottom.

The exposure of quantitative data from field test results are as outlined in the following table:

Table 4.15
Result Value Small Field Trials

No	Question	x_1	x_2	x_3	x_4	x_5	x_6	$\sum x$	$\sum xi$	P(%)	Criteria Validation	Explanation
1	Media props hydropower (wind) can facilitate you in learning	4	4	4	4	4	4	24	24	100	Very Valid	No revision
2	With the media props can give you the spirit in learning	4	4	4	4	4	4	24	24	100	Very Valid	No revision
3	Media props in accordance with the teaching on the theme always save energy	4	4	4	4	4	4	24	24	100	Very Valid	No revision
4	What is interesting props	4	4	4	4	4	4	24	24	100	Very Valid	No revision
5	Instructions on using these props can be understood	4	3	3	4	4	4	22	24	91,6	Valid	No revision
6	The language used in the instructions for use can be understood	4	3	4	4	4	4	23	24	95,8	Valid	No revision
Total		24	22	23	24	24	24	141	144	97,91	Valid	No revision

Explanation :

x_1: Respondent 1 is class IV SD Plus Al-Kautsar named AliyaSyaharbanu

x_2: Respondent 2 is class IV SD Plus Al-Kautsar named Erritrhina

x_3: Respondent 3 is class IV SD Plus Al-Kautsar named Muhammad Zayyan

x_4: Respondent 4 is class IV SD Plus Al-Kautsar named AizharDaffa

x_5: Respondent 5 is class IV SD Plus Al-Kautsar named DeaMarshakiano

x_6: Respondent 6 is class IV SD Plus Al-Kautsar named EgaDeemas

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

$$= \frac{141}{144} \text{ x } 100\% = 97{,}91\%$$

Results of the assessment test small groups on each component as a quantitative analysis of the statistics show small group trial can be interpreted as follows:

a. No. 1 shows that by fourth grade students, this media can facilitate learning with validity of 100%.

b. No. 2 shows that by fourth grade students, the use of IPA's media can encourage learning with validity of 100%.

c. No. 3 shows that by fourth grade students, the media according to the study on the theme always save energy with validity of 100%.

d. No. 4 shows that by fourth grade students, this medium attracts students with a validity of 100%.

e. Number 5 indicates that according to the fourth graders, instructions for using these props can be understood percent validity of 91.6%.

f. No. 6 shows that by fourth grade students, the language used in the instructions for use can be understood by the percent of the validity of 95.8%.

Table 4.16
Frequency Distribution Level Test Validity Small Group

The level of validity	F	%
Valid	6	100

The results of the small group trial SD Plus Al-Kautsar get a value of 97.91%. Once converted to the feasibility level of the qualifying table based on the average percentage, showed the percentage of achievement 97.91% are in the valid qualifications so that the media or compact disk usage instructions do not need to be revised.

According to the table 4.15, about learning media assessment test small groups to product development science learning media can be an excellent value with the percentage achieved an average 97,91% of the specified criteria.

Based on the results of the assessment small group trial with an average level of achievement of 97,91%, the media do not merit the development of revisions or improvements.

2. Field trials

This study used an experimental method, which placing the study subjects into two groups (classes) were divided into control and experimental class.

Grades were given experimental treatment that is learning to use the media props miniature hydropower (wind), while the control class using learning as normal (by the book). Researchers took 15 students of the experimental class with the criteria of correspondent is 5 students good skills, 5 correspondents capable of being, 5 correspondent poor performance. A list of names of respondents described as the following classes:

Table 4.17
A list of names of respondents grade IV A (control group) SD Plus Al-Kautsar Malang

Respondents	Name of Respondents
1	AliyaSyaharbanu
2	AmaliaAlvinaPutriAreta
3	AqilaRachmaniaAfifaSofian
4	Debby IntanLeonyWirambara
5	DiandraRasendriya Maharani
6	ErrythrinaRully Crista Galli
7	Evan RadityaTaruna Putra
8	FreyjaMazaria
9	Hafiz IkhtiarRamadhan
10	HanifaHeryaniSadida
11	HasnaTsuroyyaFahrurohman
12	Muhammad Darrel Akbar
13	Muhammad RafifPratama Putra
14	Muhammad ZayyanNuhad
15	RaiyanMulanaFahrezi

Table 4.18
A list of names of respondents grade IV B (experimental group) SD Plus Al-Kautsar Malang

Respondents	Name of Respondents
1	AdhienaLiany
2	AizharDaffaWijaya
3	AvicenaGhulam
4	DeaMarshakiano
5	EgaDeemas
6	GandungBisma
7	HanifaAlkhansa
8	Indira Gifta

9	Izzana Ahmad Arifana
10	Nainawa A.H
11	NatasyaNawal
12	NaurahAlya S
13	RaissaRatriTiyasa
14	RazaqaAzka
15	UmmuFarwah

As already described in Chapter III, the collection of data in this study using a questionnaire, achievement test pre-test and post-test.

a. Quantitative Data

Exposure quantitative data includes the results of the questionnaire scoring form of a percentage of students in the experimental class and the results of the pre-test and post-test of students in grade control and the experimental class. The quantitative data exposure test results are as outlined in the table:

.

Table 4.19
Assessment Questionnaire Experiment Group Students Of Media Miniature hydropower (wind) on the theme always save energy class IV

No	Question	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	$\sum x$	$\sum xi$	P (%)	Criteria Validation	Explanation
1	Media props hydropower (wind) can facilitate you in learning	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	59	60	98,3	Valid	No revision
2	With the media props can give you the spirit in learning	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	59	60	98,3	Valid	No revision
3	Media props in accordance with the teaching on the theme always save energy	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	60	60	100	Very Valid	No revision
4	What is interesting props	4	4	4	4	4	3	4	4	4	4	4	4	4	4	3	58	60	96,6	Valid	No revision

5	Instructions on using these props can be understood	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	59	60	98,3	Valid	No Revision
6	The language used in the instructions for use can be understood	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	60	60	100	Valid	No Revision
Total		24	24	24	24	24	23	24	24	23	24	24	22	24	24	23	355	360	98,6	Valid	No Revision

Explanation :

x_1: Respondent 1 is class IVB SD Plus Al-Kautsar named AdhienaLiany

x_2: Respondent 2 is class IVB SD Plus Al-Kautsar named AizharDaffa

x_3: Respondent 3 is class IVB SD Plus Al-Kautsar named AvicenaGhulam

x_4: Respondent 4 is class IVB SD Plus Al-Kautsar named DeaMarshakiano

x_5: Respondent 5 is class IVB SD Plus Al-Kautsar named EgaDeemas

x_6: Respondent 6 is class IVB SD Plus Al-Kautsar named GandungBisma

x_7 : Respondent 7 is class IVB SD Plus Al-Kautsar named HanifaAlkhansa

x_8: Respondent 8 is class IVB SD Plus Al-Kautsar named Indira Gifta

x_9: Respondent 9 is class IVB SD Plus Al-Kautsar named Izzana Ahmad

x_{10}: Respondent 10 is class IVB SD Plus Al-Kautsar named Nainawa

x_{11}: Respondent 11 is class IVB SD Plus Al-Kautsar named NatasyaNawal

x_{12}: Respondent 12 is class IVB SD Plus Al-Kautsar named NauraAlya

x_{13} : Respondent 13 is class IVB SD Plus Al-Kautsar named RaissaRatri

x_{14}: Respondent 14 is class IVB SD Plus Al-Kautsar named RazaqaAzka

x_{15}: Respondent 15 is class IVB SD Plus Al-Kautsar named UmmuFarwah

$P = \frac{\sum xi}{\sum x}$ x 100% = 98,6

Table 4.20
Frequency Distribution Level The Validity Of Field Trials

The Level Of Validity	F	%
Valid	6	100

Table 4.16 until 4.18 shows the data field trial results of the assessment of the product development of media hydropower (wind) miniature to improve

the understanding of the concept on the theme always save energy is 98,6% declared valid / revision.

D. Presentation of Data Results the Pretest and Posttest IV Grade SD Plus Al-Kautsar Malang

Before conducting the study, researchers conducted observations in class IV A as a control group and class IV B as the experimental group. Researchers tested the homogeneity of data between these two classes are obtained from the value pretest. Based on observations, thematic learning activities theme always save energy class IV A and IV B is done by learning according to the command of thematic books, namely lectures, explaining material, making windmills alone, and reading. In this study, researchers act as teachers in the control class and experimental class. The material treatment with the same subject, namely theme 2 always save energy sub theme 1 kinds of energy sources with a time of 3 meetings, any meeting of 2 x 35 minutes.

At the first meeting, researchers gave about the pretest to grade IV A and IV B. Providing a pretest was conducted to determine the ability of beginning students. The pretest results as presented in Table 4.20.

At the next meeting, learning activities performed by the use of media props miniature hydropower (wind) to class IV B and learning in accordance with thematic books on the fourth grade A. In the experiment class IV B, was formed two groups consisting of 7 and 8 students , Each group is assigned to assemble miniature props hydropower (wind) and try to use it, then the students write the results of his experiments.

In the control class is class IV A, the learning performed by the book, which begins with the teacher explains the material, making the waterwheel and wind, and reading. Learning the control class performed without the student groupings. After the entire learning activity is completed then the researchers gave about posttest to class IV A and IV B. posttest was conducted in order to know the extent to which students master the material after being given treatment by using media props miniature hydropower (wind) for the experimental class and by learning according to the thematic books for grade control. The posttest results as presented in Table 4.21

Table 4.21
Pretest values Between the control group and Experimental Group

The control group			Experimental Group		
No	**Name of students**	**Value**	**No**	**Name of students**	**Value**
1	Aliya Syaharbanu	87	1	Adhienna Liany	80
2	Amalia Alvina P	63	2	Aizhar Daffa	52
3	Aqila Rachmania	85	3	Avicena Ghulam	75
4	Debby Intan Leony	75	4	Dea Marshakiano	82
5	Diandra Rasendriya	78	5	Ega Deemas R	80
6	Errythrina Rully	58	6	Gandung Bisma	85
7	Evan Raditya Taruna	67	7	Hanifa Alkhansa	75
8	Freyja Mazaria	85	8	Indira Gifta	87
9	Hafiz Ikhtiari	85	9	Izzana Ahmad	45
10	Hanifa Heryani	64	10	Nainawa A.H	68
11	Hasna Tsuroyya	75	11	Natasya Nawal	54
12	Muhammad Darrel	84	12	Naura Alya	82
13	Muhammad Rafif	85	13	Raissa Ratri	62
14	Muhammad Zayyan	62	14	RazaqaAzka	70
15	RaiyanMaulana	64	15	Ummu Farwah	78

1. The average control group ($\bar{X}_1$) and experimental group ($\bar{X}_2$)

$\bar{X}_1 = \frac{\Sigma}{n1}$

$= \frac{1117}{15} = 74{,}47$

Explanation:

$\bar{X}_1$: The average value of the control group

$\bar{X}_2$: The average value of the experimental group

$n1$:The number of control group students

$\bar{X}_2 = \frac{\Sigma}{n2}$

$n2$: The number of experimental group students

$= \frac{1075}{15} = 71{,}67$

$\sum_1$: The average number of control group

$\sum_2$: The average number of control group

Table 4.22
The value of the Posttest control group and Between groups of Experiments

Control Group			Experimental Group		
No	**Name of Students**	**Value**	**No**	**Name of Students**	**Value**
1	AliyaSyaharbanu	90	1	AdhiennaLiany	93
2	AmaliaAlvina P	63	2	AizharDaffa	77
3	AqilaRachmania	91	3	AvicenaGhulam	90
4	Debby IntanLeony	83	4	DeaMarshakiano	95
5	DiandraRasendriya	90	5	EgaDeemas R	85
6	ErrythrinaRully	78	6	GandungBisma	100
7	Evan RadityaTaruna	76	7	HanifaAlkhansa	83
8	FreyjaMazaria	96	8	Indira Gifta	100
9	Hafiz Ikhtiari	90	9	Izzana Ahmad	85

10	Hanifa Heryani	68	10	Nainawa A.H	83
11	Hasna Tsuroyya	81	11	Natasya Nawal	85
12	Muhammad Darrel	93	12	Naura Alya	100
13	Muhammad Rafif	88	13	Raissa Ratri	88
14	Muhammad Zayyan	68	14	Razaqa Azka	100
15	Raiyan Maulana	68	15	Ummu Farwah	90

2. Data Analysis

In this research using descriptive analysis. Descriptive analysis is used for the purpose of describing data. Data were described among other data of *pretest* and *posttest* in the experimental group and the control group. Test the assumption that the initial data analysis homogeneity test.

Test of homogeneity between the two classes of control class and experimental class using the t test at pretest with a significance level of 0.05. The t-test is done after knowing the diversity of the data. After the data calculated as follows:

$F_{\text{hitung pretest}} = \frac{S^2 \text{besar}}{S^2 \text{kecil}} = \frac{S^2 \text{ eksperimen}}{S^2 \text{kontrol}} = \frac{167,67}{109,84} = 1,04$

F_{tabel} = f 0,05, nb-1, nk-1

= f (0,05, 14,14)= 2,48

$F_{hitung} < F_{tabel}$ → H_0 diterima

Nilai signifikansi α (0,05)→ H_0 diterima (kedua ragam sama)

It can be concluded that the variance value control class and experimental class both homogeneous. The ability to see both the same class or not (homogeneous / no) used the average.

Diket :$\bar{X}_1$= 74,47 n_1 = 15 S_1^2 = 109,84

$\bar{X}_2$ = 71,67n_1 = 15 S_2^2 = 167,67

$$S^2gab = \frac{(n_1-1)S_1 2 \ +(n_2-1)S_2 2}{n_{1+}n_2}$$

$$S^2gab = \frac{(14.109,84+14.167,67)}{(15+15-2)} = 138,75$$

$$T_{calculate} = \frac{(\bar{X}_1 - \bar{X}_2)-(\mu_1 - \mu_2)}{\sqrt{\frac{s^2_{gab}}{n_1}+\frac{s^2_{gab}}{n_2}}}$$

$$= \frac{|(74,47-71,67)|-0}{\sqrt{\frac{138,75}{15}+\frac{138,75}{15}}} = |0,65|$$

Explanation:

$\bar{X}_1$: The average value of the control group

$\bar{X}_2$: The average value of the experimental group

n_1 :The number of control group students

n_2 :The number of experimental group students

μ_1 : The average value of population control class

μ_2 : The average value of population control class

t_{table}= 2,048

$t_{calculate} < t_{table}$ → accepted H_0

Value significance (0,520) > α (0.05) → accepted H_0 ,$\mu_1 = \mu_2$

In conclusion the value pretest between the control class and experimental class is the same, and both classes is said to be ***homogeneous***.

In decision making by calculating the t-test manually, the results obtained through the steps as follows:

3. Make a hypothesis
   a. Hypothesis H_0 namely:

      There is no difference between the concept of understanding the students class IVB which uses props hydropower (wind) miniature on the theme always save energy with the students Class IVA which do not use props hydropower (wind) miniature on the theme of always save energy in SD Plus Al-Kautsar Malang.

   b. Hypothesis H_1 namely:

      There's a difference between understanding the IVB class students using props hydropower (wind) miniature on the theme always save on energy with the students of Class IVA which do not use props hydropower (wind) miniature on the theme of always save energy in SD Plus Al-Kautsar Malang.

4. Make a hypothesis H_0 and H_1 in the form of statistics

   $H_0 : \mu_1 = \mu_2$

$H_1 : \mu_1 \neq \mu_2$

5. Find the average ($\bar{X}$), standard deviation (S), Variance (S^2)

a. The average control group ($\bar{X}_1$) and experimental group ($\bar{X}_2$)

$\bar{X}_1 = \frac{\Sigma}{n1}$ Explanation:

$= \frac{1223}{15} = 81{,}53$ $\bar{X}_1$: The average value of the control group

$\bar{X}_2 = \frac{\Sigma}{n1}$ $\bar{X}_2$: The average value of the experimental group

$= \frac{1354}{15} = 90{,}27$ $n1$: The number of control group students

$n2$:The number of experimental group students

$\sum_1$: The average number of the control group

$\sum_2$: The average number of the experimental group

b. Standard deviation (S1) control group and experimental group (S2)

$S_1 = \sqrt{\frac{\sum(x-\bar{X}_1)^2}{n1-1}}$ Explanation:

$= \sqrt{\frac{1625{,}68}{14}}$ S_1 :The standard deviation of the control group

$= \sqrt{116{,}12}$ S_2 :The standard deviation of the control group

$= 10{,}78$ x : The value of the respondents

$\bar{X}_1$: The average value of the control group

$S_2 = \sqrt{\frac{\sum(x-\bar{X}_1)^2}{n2-1}}$ $\bar{X}_2$: The average value of the experimental group

$= \sqrt{\frac{778,96}{14}}$ *n*1 :The number of control group students

$= \sqrt{55,64}$ *n*2 :The number of experimental group students

= 7,46

c. Variance control group (S_1^2) and experimental group (S_2^2)

$S_1^2 = \frac{\sum(x-\bar{X}_1)^2}{n1-1}$ Explanation:

$= \frac{1625,28}{14} = 116,12$ S_1^2 = Variance control group

S_2^2 = Variance experimental group

$S_2^2 = \frac{\sum(x-\bar{X}_2)^2}{n2-1}$ x : The value of the respondents

$= \frac{778,96}{14} = 55,64$ $\bar{X}_1$: The average value of the control group

$\bar{X}_2$: The average value of the experimental group

*n*1 :The number of control group students

*n*2 :The number of experimental group students

Table 4.23
The average value, standard deviation, variance

Value	Control Group	Experimental Group
Average	81,53	90,27
Variance	116,12	55,64
Standard Deviation	10,78	7,46
The Number Of Students	15	15

The highest possible value = 100	90	100
The lowest value that may be achieved = 0	63	77

From the table above it is known that the results of the control class average value of 81.53, while the results of the experimental class students to an average value of 90.27. The increase in the average value between the value of post test control class and the average value posttest experimental classes which increased 8,74%. Can be evidenced by the percentage increase in the value table below:

The average score of posttest control class and posttest experimental class

Percentage%	**Category**
20-36	Very less
36-52	Less
52-64	Enough
64-84	Good
84-100	Very good

From the results above that the percentage increase in value compared to the value of a control class posttest post test experimental classes included in the very good category..For more details can be seen in the following graph:

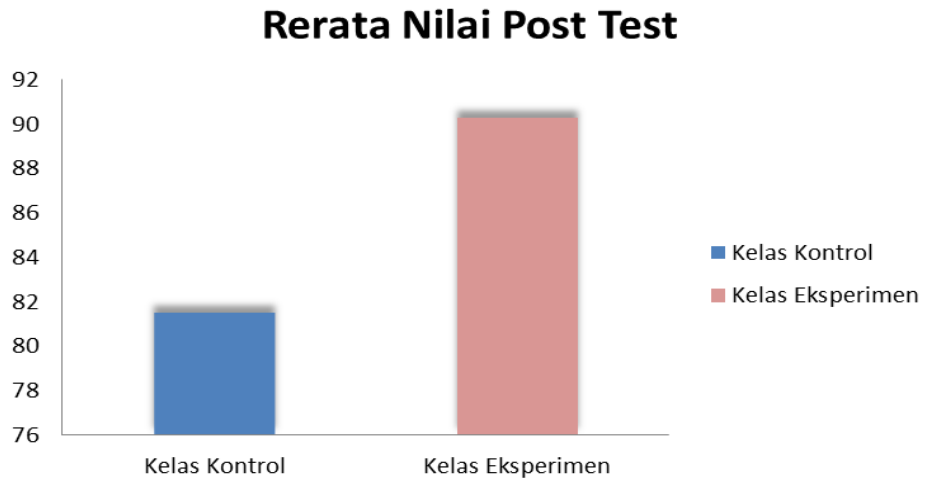

Diagram 4.1
Graph Results Average Value Class and Class Control experiments

6. Looking $t_{calculate}$ formula

The t-test is done after knowing the diversity of the data. After the data calculated as follows:

$$f_{posttest\ calculate} = \frac{S^2 besar}{S^2 kecil} = \frac{S^2\ kontrol}{S^2 eksperimen} = \frac{116,12}{55,64} = 2,08$$

f_{table} = f 0,05, nb-1, nk-1

= f (0,005, 14,14)= 2,48

$f_{calculated} < f_{table} \rightarrow H_0$ accepted

significance value $\alpha\ (0,05) \rightarrow H_0$ (the same variety)

It can be concluded that the variance value control class and experimental class both homogeneous. To see the difference in understanding of the concept between students of class IVB which uses props miniature hydropower (wind) on the

theme always save energy by graders IVA does not use props miniature hydropower (wind) on the theme always save energy in SD Plus Al-Kautsar Malang same or not used mean.

is known : $\bar{X}_1$: 81,53 n_1= 15 S_1^2 : 116,12

$\bar{X}_2$: 90,27 n_2= 15 S_2^2 : 55,64

$$S^2gab = \frac{(n_1-1)S_1 2 + (n_2-1)S_2 2}{n_1+n_2-2}$$

$$S^2gab = \frac{(14.116,12+14.55,64)}{(15+15-2)} = 85,88095$$

$$t_{calculate} = \frac{(\bar{X}_1-\bar{X}_2)-(\mu_1-\mu_2)}{\sqrt{\frac{s^2gab}{n_1}+\frac{s^2gab}{n_2}}}$$

$$= \frac{|(81,53-90,27)|-0}{\sqrt{\frac{85,88095}{15}+\frac{85,88095}{15}}} = |-2,58|$$

7. Determining t_{table}

   Significance level ($\alpha = 0,05$)

   dk = n1-1 = 15-1= 14, in order to obtain the data table to -14 thus it $t_{table} = 2,14$

8. Decision Making Criteria

   a. If: $t_{calculate} \leq t_{table}$, then H_0 accepted and H_1 rejected

   b. If: $t_{calculate} \geq t_{table}$, then H_0 rejected and H_1 accepted

9. Compare $t_{calculate}$ and t_{table}

   Results $t_{calculate}$ and t_{table} is -2,58≥2,14, it can be concluded H_0 and H_1 accepted. By this it can be concluded that "there are differences in understanding

of the concept between students of class IVB and the use of props miniature hydropower (wind) on the theme always save energy with grade IV A that do not use props miniature hydropower (wind) on the theme always save energy.

This is supported by the results of interviews with some of the developers of the validation subject field trials.

"I'm having trouble on the theme always save energy and the energy materials that changes. Mother I'm confused. In addition I am confused with how to change the energy of motion into electricity and then into light. But with the media that mothers bring about change in the energy of motion into electricity is I'm happy, I can know and understand because the mother not only explain the course but we were also asked to compose the media props. So I can see firsthand and can try."

"I wish every time a science lesson like this continue mother there is a medium, I am so pleased to take this lesson. Media about miniature hydropower (wind) was cool, ma'am, I could see clearly and I can also compose and try it today."

Thus the results of the interview some subjects of validation that Raisa and Ega when the developer asked his opinion on learning in the classroom using a miniature media hydropower (wind) on the theme always save energy.

CHAPTER V
DISCUSSION

In this chapter will discuss some of the things include, a) The Process of the development of media props wind power plant miniature ,b) The effectiveness of media development props wind power plant miniature, c) Understanding the concept of student related use of media props wind power plant miniature learning activities on the theme always save energy. Exposure to more, as follows:

A. Analysis of process of Media Development Props Wind Power Miniature

1. The process Of Product Development

Development of wind power plant miniature props is based on the condition that the unavailability of media props IPA on the theme always save energy sufficient. Especially those which have characteristics not only describes forms of energy but also explains the energy change. Thus this learning media can enhance students understanding of concepts in achieving the results set out in the learning objectives.

The results of product development in the form of media props wind power plant miniature on the theme always save energy which is equipped with a compact disk as the instructions for use which are used as a guide to students and teachers in learning, especially props Sciences on the theme always save energy class IV is intended as a support in the learning process is intended as a

support in the process of learning activities. This is because, particularly instructional media props primary school level and madrasah is still very limited. On the other hand some of the material that is inside a theme always save energy, especially in the Natural Sciences have a level of understanding that is quite difficult to accept students who are in the concrete operational stage.

Basically, the media serves as a tool in the learning activities in the form of facilities that can provide direct experience to students in order to encourage motivation to learn, clarify and simplify complex and abstract concepts become more simple, concrete and easy to understand.[70]According to Edgar Dale "Classification learning experiences of children starting from the things most concrete up to the things that are considered the most abstract." The classification of these experiences can be followed widely by educators in determining the tools what is supposed to be used in the learning activities, the time this medium has the function simplify learning for learners and provide a real experience of something that is abstract.

Besides the development of media also places emphasis on understanding the concept of theme always save energy materials forms of energy and energy changes. Understanding the concept is considered very important as the mastery of the concept will facilitate students in learning science. At each study sought more emphasis on mastery of concepts that the students have the benefit of a good foundation for achieving basic abilities such as reasoning and problem solving.

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[70]Usman, M.Basyiruddin Asnawir, *Media Pembelajaran*, (Jakarta: Ciputat press, 2002), hlm. 21

Understanding a person's ability to understand or comprehend something after something is known and remembered, in other words understanding is knowing about something and be able to see it from different angles. With the ability of learners to explain or describe, then such learners have understood the concept or the principle of a lesson material in althoughthe explanations given have a sentence structure that is not the same as a given concept but intent and same purpose.

The process of learning science is basically seeks to equip learners in understanding the concepts, principles, attitudes, and certain skills using appropriate media according to the characteristics of the material to be delivered. With the exposure which is becoming one of the developers behind in developing media products props wind power plant miniature.

In relation with the problems faced by the unavailability of media props are developed, the development results can be used as an alternative medium of learning, in addition to teaching materials that have been used and are used in learning that have taken place.

Procedure development of instructional media products is achieved through several stages which include:

a. The preliminary study stage to conduct a needs analysis is the most important step to development which collects a variety of information, both from observation, and interviews. This activity is very easy to do because by collecting a variety of information developers can directly find the real

conditions in the field. Observations and interviews can be used as an initial step to develop the product.

b. Formulation of the problem and objectives are key things to do before designing a media development. Because the goal setting can be seen direction a product that will be developed.

c. Media development stage props using Borg and Gall design models and test phase / validation in the form of instructional media.

Product development of instructional media has done perfecting gradually through validation by subject matter experts Natural Sciences, expert product design, teacher thematic class IV and target use of instructional media product development through small group trial and field trials IV A and IV B SD PlusKautsar Malang.

Product development media wind power plant miniature on the theme always save energy has advantages and disadvantages. Excess media props are developed include:

a. Media props developed this presents a miniature hydropower (wind) is a form of energy changes of motion into electrical energy and then into light energy. While there are only limited media images are accompanied by readings without including the workings of the tool.

b. In the manual that is on a compact disc presents the tools and materials for miniature hydropower (wind), way of making, instructions for use and

information about the application of wind energy has been applied in remote areas.

c. Inviting students active and participation learning activities, this is because the media props are developed, pupils can opt to assemble and operate props interchangeably.
d. Media props wind power plant miniature on the theme always save energy developed is accompanied by a compact disk as the instructions for use, making it easier for users to understand media use props.

As for the deficiency of media props wind power plant miniature on the theme always save energy developed to the fourth grade students in SD Plus Al-Kautsar Malang is as follows:

a. Learning is limited to one that is on the kinds of energy
b. Only reached the stage of field trials (two classes)
c. Routinely check the LED lights, if the light is not illuminated, the LED lights immediately replaced with new LED lights so that the lights can be lit again.

Tables 4.3, 4.9 and 4.10 shows the results of validation to some experts, including subject matter experts, media specialists and teachers teaching to the media thematic wind power plant miniature props on the theme always save energy and compact disks as media usage instructions props rated valid, as evidenced by the average percentage of the acquisition of validation results by subject matter experts showed 98% declared invalid, the results of validation by expert instructional media showing 94% declared valid, the validation results by

thematic teacher showed 92.5% declared invalid. This shows that the media props miniature hydropower (wind) on the theme always save energy is good and fit for use based on the value of some experts.

Additionally based on the value of some experts, the development of media props miniature hydropower (wind) on the theme always save energy can be said to be good and decent because have several advantages. As for the surplus among the props are developed, props developed presents a miniature hydropower (wind) is a form of energy changes of motion into electrical energy and then into light energy. While there are only limited media images are accompanied by readings without including the workings of the tool. So understanding the concept of students regarding the material energy and the change can be improved by good.

2. The Effectiveness of a Wind Power Plant Miniature Media Development

Effectiveness of wind power plant miniature props can be expressed in several criteria props. Various criteria that must be considered in selecting props as a learning tool is as follows:[71]

1. The accuracy of the learning objectives, that is to say in choosing the media adapted to the learning objectives that have been set support for the content of learning materials, media have to be facts, principles, concepts, and generalizations that are in need of more media understood learners.
2. Ease of obtaining media, media chosen should be easily obtained or created.

[71]Nana Sudjana dan Ahmad Rifai, *Media Pengajaran*.(Bandung: Sinar Baru Algesindo, 1991), hlm. 4

3. Teachers' skills in using it.
4. Availability of time to use it.
5. According to the stage of student thinking.

In this study, props developed meets the criteria of effectiveness. It can be seen from the process of learning activities conducted on the experimental class. In the aspect of the precision of the props with the purpose of learning is considered to be appropriate. Props are developed already includes concepts and generalizations energy materials and amendments requiring the media to understand. But in the development of props little difficulty in the making process. There are some challenges in the process of making them is:

1. If there are some wires are broken or not in contact with tin in the soldering process, the LED lights will not turn on.
2. Necessary routine checks on the lights and some components that have been soldered wires on props developed.

Props miniature hydropower (wind) on the theme always save energy is very easy to operate, because product development is accompanied by instructions for use in the form of a compact disk. Additionally, miniature props hydropower (wind) does not require a lot of time in operation. So that teachers can use props miniature hydropower (wind) in the learning activities to achieve learning objectives.

Based on observations in the experimental class, the students were active and able to report the results of the experiment and was able to restate the concepts learned in the product development of miniature props hydropower (wind) on the theme always save energy. Students can also use props and demonstrating well.

3. Understanding the concept of Students Regarding Use Media Wind Power Plant Miniature

After learning activities in the experimental class and control class, researchers conducting pretest and posttest to determine the increase students understanding of the concept achieved within 3 meetings.

The learning activities theme always save energy, especially the Natural Sciences using miniature media hydropower (wind) developed a positive effect on students understanding of the concept. Achievement of the effectiveness of media props posttest indicated by the results of experimental class is better than the posttest control class.

In addition, the miniature media hydropower (wind) can effectively improve understanding of the concept of fourth grade students in SD Plus Al-Kautsar Malang. It can be seen from the average (mean) grade control is smaller than the experimental class in question posttest is $81.53 \leq 90.27$, it can be said that the media props miniature hydropower (wind) significant differences in media tool miniature props hydropower (wind) to improve the understanding of the concept of the IPA on the theme always save energy materials and changes in class IV SD Plus Al-Kautsar Malang.

The test results unpaired t-test on a manual calculation with a confidence level produced 0.05 t = 2.58, while table = 2.14. Because $t_{calculated} \geq t_{table}$, then H_0 and H_1 accepted. This means that there are differences between understanding of the concept of fourth grade students who use props and miniature hydropower (wind) on the theme always save energy with a fourth grade students who did not use props miniature hydropower (wind) on the theme always save energy.

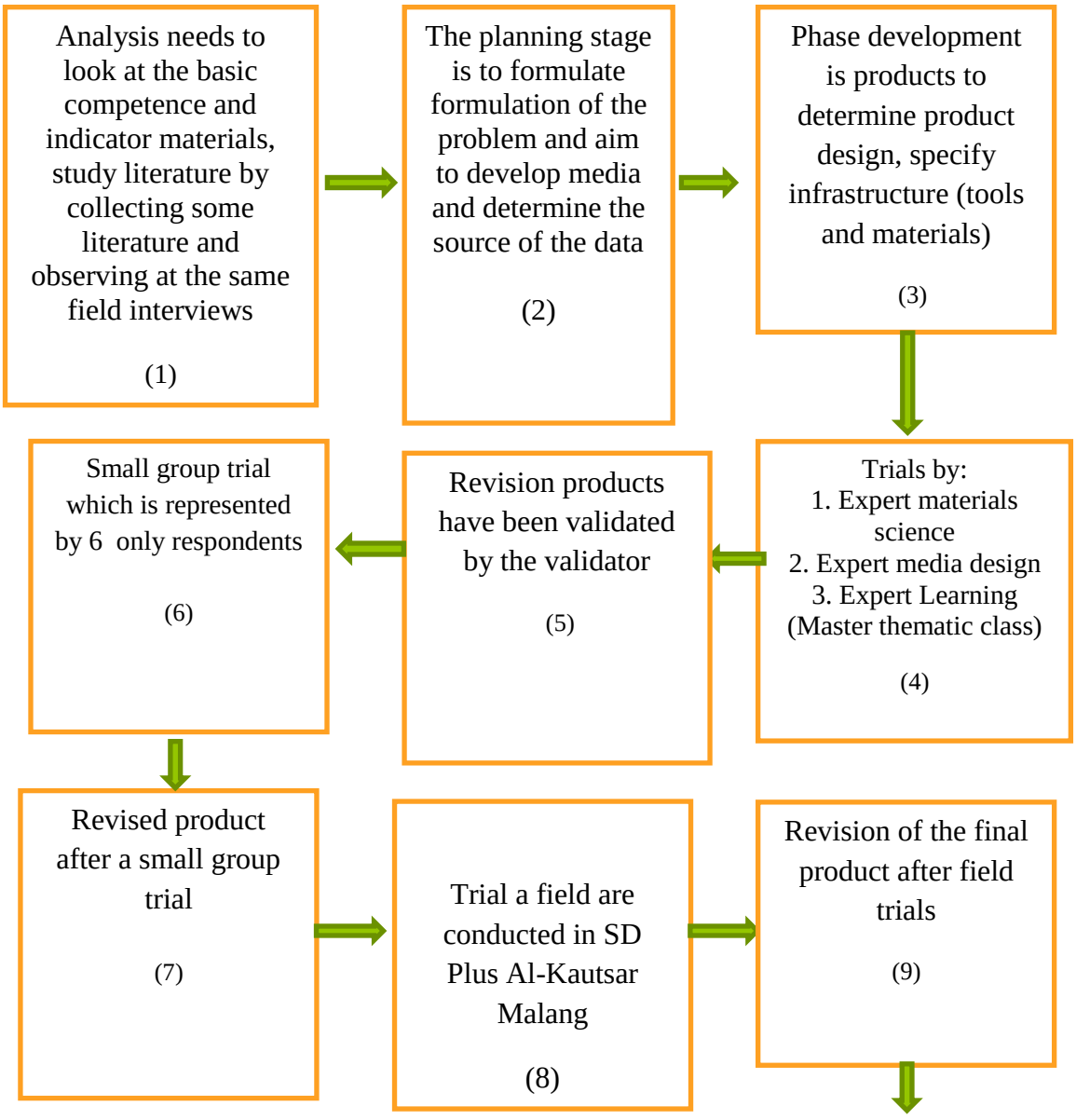

CHART 3.3

The Final Part of the Findings and Discussion

CHAPTER VI

CONCLUSION

In this chapter will discuss some of the things include, a) Conclusion of the process development, b) Suggestion. Exposure to more, as follows:

A. Conclusion The Process Of The Development

Based on the results of the development process and miniature medium hydropower (wind) on the theme always save energy class IV SD Plus Al-Kautsar Malang can be concluded as follows:

1. Process development of instructional media products is achieved through several stages which include:
   a. The preliminary study stage to conduct a needs analysis.
   b. Media development stage props using Borg and Gall design models and test phase / validation in the form of instructional media.

Product development of instructional media has done perfecting gradually through validation by subject matter experts Natural Sciences, expert product design, teacher thematic class IV and target use of instructional media product development through small group trial and field trials IV A and IV B SD PlusKautsar Malang.

The development of these props have produced in the form of miniature props hydropower (wind) and a compact disk as manual operation using props. Product is in compliance with the criteria media component as valid by way of expert validation, test a small group and field trials. Results obtained are as follows:

a. Responses and validation of subject matter experts on media development results miniature props hydropower (wind) is very good based on the assessment of hydropower miniature media with validity percentage reached 98%.
b. Responses and validation of product designs against media expert media development results miniature props hydropower (wind) is very good based on the assessment of hydropower miniature media with validity percentage reached 94%.
c. Responses and validation learning experts or teachers thematic class IV on the results of the development of media props miniature hydropower (wind) is very good based on the assessment of hydropower miniature media with validity percentage reached 92.5%.
d. Responses assessment of all fourth graders on the results of the development of media props miniature hydropower (wind) is very good based on the assessment of hydropower miniature media with validity percentage reached 98.6%.

3. The development of media props miniature hydropower (wind) that is effective and can motivate students to do with the way the products with media props IPA miniature hydropower (wind) on the theme always save energy class IV to improve the understanding of the concept which is equipped with a compact disk as user manuals props. The product has met as a component of a good media props. Media developed props can add variety to the learning process of learning media Natural Sciences in SD Plus Al-Kautsar. Results of the assessment of media development these props have high validity rate based on the questionnaire several experts covering material, expert instructional media, and thematic fourth grade teacher.

   Development of a miniature media hydropower (wind) can be expressed effectively in the learning activities. In line with observations the experimental class, the students were active and able to report the results of the experiment and was able to restate the concepts learned with the help of product development miniature props hydropower (wind) on the theme always save energy. In addition students can also use props and demonstrating well. Thus it can be stated that the media developed the miniature props media hydropower (wind) on the theme always save energy can be said to be effective in accordance with predetermined criteria, so that the media can support learning activities.

3. The results of the analysis of learners understanding of the concept of class IV A (control group) and IV B (experimental class) obtained results indicate the

results of the students' grades (scores) is smaller than the control class experimental class. It can be seen from the average (mean) grade control is smaller than the experimental class, namely 81.53 ≤ 90.27, it can be said that the media props miniature hydropower (wind) significant differences in media props miniature hydropower (wind) to improve the understanding of the concept of the IPA on the theme always save energy materials and changes in class IV SD Plus Al-Kautsar Malang.

The test results unpaired t-test on a manual calculation with a confidence level produced 0.05 t = 2.58, while table = 2.14. Because t calculate ≥ t table, then H_0 and H_1 accepted. This means that there are differences between understanding of the concept of fourth grade students who use props and miniature hydropower (wind) on the theme always save energy with a fourth grade students who did not use props miniature hydropower (wind) on the theme always save energy.

Thus the media props miniature hydropower (wind) on the theme always save energy class IV SD Plus Al-Kautsar Malang said to have good quality. This is because the media use these props can help improve understanding of the concept on the theme always save energy especially the material science of energy and change.

B. Suggestion

Based on the above conclusions that can be put forward some suggestions are:

1. Product development can be made to the size of the medium, so it can easily be used in the classroom and outside the classroom.
2. Product development can be accompanied by an animated video or interactive multimedia.