# THE DEVELOPMENT OF POPSCRA BOOK LEARNING MEDIA BASED ON MNEMONIC STRATEGIES ON MEASUREMENT MATERIALS TO IMPROVE STUDENT LEARNING IN GRADE 4 SDN SUMBERKEMBAR MOJOKERTO

# **THESIS**



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ISLAMIC ELEMENTARY SCHOOL TEACHER PROGRAM

ISLAMIC ELEMENTARY SCHOOL TEACHER EDUCATION DEPARTMENT

TARBIYAH AND TEACHING TRAINING FACULTY

MAULANA MALIK IBRAHIM STATE ISLAMIC UNIVERSITY MALANG

SEPTEMBER, 2020

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#### THESIS

Presented to Tarbiyah and Teacher Training Faculty

Maulana Malik Ibrahim Islamic State University Malang

In Partial Fullfillment of the Requirement for

Bachelor Degree in Education



By: Vivy Endang Try Santi NIM. 16140058

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#### APPROVAL SHEET

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#### **DEDICATION**

Alhamdulillahi rabbil aalamiin, hamdan syukron lillah, for all His blessing and guidance. Sholawat and salam uninterruptedly extended only to our prophet Muhammad SAW. The author dedicates this study to:

My beloved parents, Suhartini and Suwarto, who with the love, support, advice, encouragement, prayer has no limits and sacrifice that is not replaceable made me like this time.

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My little family in PGMI'E ICP 2016.

Big Family of Islamic elementary school teacher education students in 2016.

And all parties who provide prayers and guidance.

Thanks for all.

#### **MOTTO**

وَ عَسَىٰ أَن تَكْرَهُواْ شَيْئًا وَهُوَ خَيْرٌ لَّكُمْ ۖ وَعَسَىٰ أَن تُحِبُّواْ شَيْئًا وَهُوَ شَرُّ لَّكُمْ ۗ وَاللهُ وَعَسَىٰ أَن تُحِبُّواْ شَيْئًا وَهُوَ شَرُّ لَّكُمْ ۗ وَاللهُ يَعْلَمُ وَأَنتُمْ لَاتَعْلَمُونَ (٢١٦)

"But perhaps you hate a thing and it is good for you, and perhaps you love a thing and it is bad for you. And Allah knows, while you know not"

(QS. Al-Baqarah: 216)<sup>1</sup>

<sup>&</sup>lt;sup>1</sup> Al-Qur'an Terjemah dan Asbabun Nuzul (Surakarta: CV. Al-Hanan, 2009), p. 34.

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Attachment : 4 (Four) Axemplar

To Whom It May Concern,

Dean of Tarbiyah and Teaching Training Faculty

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In

Malang

Assalamu'alaikum Wr. Wb

After Carrying out several times for guidance, both in term of content, language, and writing techniques, and after reading the following thesis:

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Mnemonic Strategies on Measurement Materials to Improve

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

Wassalamu'alaikum Wr. Wb

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# CERTIFICATE OF THESIS AUTHORSIP

I hereby certify that the thesis entitled "The Development of Popscra Book Learning Media Based on Mnemonic Strategies on Measurement Materials to Improve Student Learning in Grade 4<sup>th</sup> SDN Sumberkembar Mojokerto" there has never been a work submitted to fulfill the requirement for sarjana pendidikan (S. Pd) in college, and to my knowledge, there are also no works or opinions that have been written or published by another person, except those that written reference in this text and mentioned in the list of references.

Malang, September 5<sup>th</sup> 2020

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#### **PREFACE**

#### Bismillahirrahmanirrahiim

All praise and thanks to Allah SWT The Lord of the world, the creator of everythings in this universe, who has given us the mercy and blessing, so that the writer can finish the thesis entitle "Development of Tall Book Learning Media Based on Mnemonic Strategies on Measurement Materials to Improve Student Learning in Grade 4 SDN Sumberkembar Mojokerto. Peace and Salutation may always be given to our prophet Muhammad SAW, who has guided us from the darkness to the lightness.

The thesis is proposed to fulfill the requirement to finish the study and the degree of Sarjana Pendidikan (S. Pd) at Faculty of Education and Teacher Training. In other hand this study also a simple contribution of the author to world of ecucation.

The author would like to thanks and appreciation as much as possible with the word jazakumullah Ahsanal Jaza' inparticular who was involved over the process of the writing either direct or indirect:

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Malang, September 9th, 2020

Author

# TRANSLATION GUIDELINES OF ARAB LATIN

Translation of Arab-latin in this thesis utilize the translation guidelines based on the agreementand decision together between Ministry of Religion and Ministry of Education and Culture of Republic of Indonesia number 158 year 1987 and number 0543/b/U/1987. That is could explained as follow:

# A. Letter

1	=	a	ز	=	Z	ق	=	q
ب	=0	b	س	_=/	S	[ي	=	k
ت	(=)	t	m	=	Sy	J	=	1
ث	7= '	ts	ص	=	Sh	م	=	m
3	= 7	j	ض	=	dl	ن		n
۲	=	<u>h</u>	ط	==	th	و	=	w
خ	= ,	kh	ظ	=	zh	٥	=	h
7	=	d	ع	=	•	۶	=	,
ذ	=	dz	غ	=	gh	ي	=	у
ر	=	r	ف	=	f		=	

# **B.** Long Vocal

# C. Diphthong Vocal

# LIST OF TABLE

Table 1.1 Originality of Research
Table 2.1 Meters Long with a Unit Conversion
Table 2.2 Conversion of Unit Weight with Gram
Table 2.3 Mindset
Table 3.1 Questionnaire Rating Scale for Experts
Table 3.2 Questionnaire Rating Scale for Students
Table 3.3 Product Qualification Criteria
Table 4.1 Content Expert Validation Results
Table 4.2 Content Expert's Criticism and Suggestions
Table 4.3 Content Expert Product Revision
Table 4.4 Design Expert Validation Results
Table 4.5 Design Expert's Criticism and Suggestions
Table 4.6 Design Expert Product Revision
Table 4.7 Learning Expert Validation Results
Table 4.8 Learning Expert's Criticism and Suggestions
Table 4.9 Results of Student Questionnaire Assessment of Popscra Book Media
69
Table 4.10 Results of the Experiment Class Pre-test and Post-test71
Table 4.11 Results of Pre-test and Post Test Control Class
Table 4.12 Results of the Independent Sample T-Test Analysis
Table 5.1 Popscra Book Mnemonic Based Learning Media Specifications78

# LIST OF PICTURE

Picture 2.1 Value Unit Long	29
Picture 2.2 Value Unit Weight	29
Picture 3.1 Development Model Borg and Gall	38
Picture 4.1 Front and Back Cover	54
Picture 4.2 Foreword5	54
Picture 4.3 Design Instructions for Use	55
Picture 4.4 Definition of units of length and weight	55
Picture 4.5 Correlation between units of weight	56
Picture 4.6 Length and Weight Unit Reminder5	56
Picture 4.7 The material is used as a scraft book	56
Picture 4.8 Ladder unit length and weight5	57
Picture 4.9 Length Unit Conversion Table	57
Picture 4.10 Weight Unit Conversion Table	58
Picture 4.11 Image of Measuring Unit Length	58
Picture 4.12 Image of Measuring unit weight	58
Picture 4.13 Evaluation Unit of Length	59
Picture 4.14 Evaluation Unit of Weight	59
Picture 4.15 Author Biography6	50

#### LIST OF APPENDIX

Appendix 1 Evidance of Consultation

Appendix 2 Letter of Research Permission

Appendix 3 Letter of Research at SDN Sumberkembar Mojokerto

Appendix 4 Letter of Application Validator

Appendix 5 Instrument of Mathematics Learning Expert Validation

Appendix 6 Instrument of Design Media Expert Validation

Appendix 7 Instrument of Fifth Grade Mathematics Subject Teacher

Appendix 8 Instrument of Field Trial Questionnaires

Appendix 9 Identity Subjects of Trial test

Appendix 10 Pre Test Control and Experiment Group Data

Appendix 11 Post Test Control and Experiment Group Data

Appendix 12 Teacher Interview Sheet

Appendix 13 Table of T-Test Results Using SPSS

Appendix 14 Documentation of Activity

Appendix 15 RPP

Appendix 16 Curriculume Vitae

# TABLE OF CONTENT

# COVER PAGE

LITTLE PAGEi
APPROVAL SHEETii
LEGITIMATION SHEETiii
DEDICATIONiv
MOTTOv
ADVISOR OFFICIAL NOTEvi
CERTIFICATE OF THESIS AUTHORSIPvii
PREFACEviii
TRANSLATION GUIDELINES OF ARAB LATINx
LIST OF TABLExi
LIST OF PICTURExii
LIST OF APPENDIXxiii
TABLE OF CONTENTxiv
ABSTRAKxvii
ABSTRACTxviii
xix مستخلص البحث
CHAPTER I INTRODUCTION1
A. Background of the Study1
B. Formulation of the Problem4
C. Development Objectives

D.	Development Benefits	.5
E.	Assumptions Development	.6
F.	Development Scope	.7
G.	Product Specifications	.7
H.	Originality of the Product	.8
I.	Key of Terms	.11
J.	Systematic of the Writing	.13
СН	APTER II LITERATURE REVIEW	.15
A.	Literatures of Theorems	.15
	1. Development	.15
	2. Learning Media	.16
	3. Learning Mathematics in Elementary Schools	.20
	4. Popscra Book Media	.25
	5. Measurement	.26
	6. Mnemonics	.29
	7. Learning Outcomes	.31
B.	Framework of Thinking	.34
CH.	APTER III RESEARCH METHODS	.37
A.	Types of Research	.37
	Development Model	
C.	Development Procedure	.40
D.	Product Test	.42
	1. Trial Design	.43
	2. Subjects Trial	
	3. Types of Data	.45
	4. Data Collection Intrument	.45
	5. Data Analysis Technique	.46
CH.	APTER IV DEVELOPMENT RESULTS	.50
ΑΊ	The Process of Developing Popscra Book Learning Media	50

1. Preparation and Data Collection Stage	50
2. Popscra Book Media Development Stage	51
B. Results of the Popscra-Book Learning Media Interesting	68
C. Differences in Learning Outcomes for Students Learn Using Popscra	
Book Media and Students Do Not Use Media	69
1. Data Analysis Using Formulas Manually	70
2. Data Analysis Using SPSS Statistics Application 23	73
CHAPTER V	75
A. The Process of Developing Popscra Book Learning Media	75
1. Analysis of Content or Material Expert Validation Results	77
2. Analysis of Media Design Expert Validation Results	79
3. Analysis of Learning Expert Validation Results	80
B. Results of the Popscra-Book Learning Media Interesting	82
C. Differences in Learning Outcomes for Students Who Learn Using Popso	cra
Book Media and Students Who Do Not Use Media	85
CHAPTER VI CONCLUSION	8
A. Conclusion	
B. Suggestion	89
BIBLIOGRAPHY	90
APPENDIXES	94

#### **ABSTRAK**

Santi, Vivy Endang Try. 2020. Pengembangan Media POPSCRA Book Berbasis Mnemonik pada Materi Pengukuran untuk Meningkatkan Hasil Belajar Siswa Kelas IV SDN Sumberkembar Mojokerto. Skripsi, Jurusan Pendidikan Guru Madrasah Ibtidaiyah, Fakultas Ilmu Tarbiyah dan Keguruan, Universitas Islam Negeri Maulana Malik Ibrahim Malang. Pembimbing, Nuril Nuzulia, M. Pd. I.

Kata Kunci: Media POPSCRA Book, Materi Pengukuran, Hasil Belajar Siswa

Penggunaan media pembelajaran dalam dunia pendidikan sangatlah penting dalam meningkatkan motivasi, pengetahuan serta intelektual peserta didik. Namun, pentingnya, ketersediaan media pembelajaran yang menarik tersebut tidak akan berpengaruh secara maksimal ketika media pembelajaran di sekolah masih sangat minim dan guru hanya menggunakan buku teks pada saat proses pembelajaran. Hal tersebut terjadi di SDN Sumberkembar Mojokerto. yang berpengaruh pada hasil belajar siswa yang kurang maksimal.

Tujuan dari penelitian ini adalah sebagai berikut (1) Untuk mengetahui proses pengembangan media pembelajaran *popscra book* berbasis mnemonik pada materi pengukuran di kelas IV SDN Sumberkembar Kabupaten Mojokerto. (2) Untuk mengetahui kemenarikan media pembelajaran *popscra book* berbasis mnemonik pada materi pengukuran di kelas IV SDN Sumberkembar Kabupaten Mojokerto. (3) Untuk mengetahui perbedaan hasil belajar siswa pada kelas yang menggunakan dan tidak menggunakan produk media *popscra book* berbasis mnemonik materi pengukuran di kelas IV SDN Sumberkembar Kabupaten Mojokerto.

Bentuk penelitian yang dilakukan adalah dengan menggunakan bentuk penelitian deskriptif dengan analisis data secara kualitatif dan kuantitatif. Metode penelitian yang digunakan yakni Research and Development (R & D). Peneliti mengadaptasi model pengembangan Borg and Gall yang telah dimodifikasi. Dari sepuluh langkah pengembangan milik Borg and Gall, peneliti hanya menerapkan tujuh langkah penelitian.

Hasil penelitian menunjukkan (1) Proses pengembangan dan penelitian ini melalui beberapa tahapan yakni: merancang produk, validasi produk, revisi dan uji lapangan (2) tingkat kemenarikan media *popscra book* ini memiliki tingkat kemenarikan yang tinggi sebesar 87%. Hal ini menunjukkan bahwa penggunaan media telah mencapai kriteria menarik dan valid. (3) Perbedaan hasil belajar siswa berdasarkan *independent sample t-test* menggunakan SPSS 20 dan secara manual dapat diputuskan bahwa H<sub>1</sub> diterima. Karena t<sub>hitung</sub> 4,033 lebih besar dari t<sub>tabel</sub> 2,100. Yang menunjukkan bahwa produk hasil pengembangan media *popscra book* materi pengukuran efektif digunakan. Hal tersebut juga menguatkan bahwa hasil belajar siswa yang belajar menggunakan media *popscra book* lebih baik daripada hasil belajar siswa yang tidak menggunakan *popscra book*.

#### **ABSTRACT**

Santi, Vivy Endang Try. 2020. The Development of Popscra Book Learning Media Based on Mnemonic Strategies on Measurement Materials to Improve Student Learning in Grade 4 SDN Sumberkembar Mojokerto. Thesis, Department of Islamic Elementary School Teacher Education, Tarbiyah and Teaching Training Faculty, Maulana Malik Ibrahim State Islamic University of Malang. Advisor, Nuril Nuzulia, M. Pd. I.

Keywords: POPSCRA Book Media, Measurement Materials, Student Learning Outcomes

The use of learning media in education is very important in increasing the motivation, knowledge and intellectuality of students. However, the importance is that the availability of attractive learning media will not have maximum effect when the learning media in schools are still very minimal and the teacher only uses textbooks during the learning process. This happened at SDN Sumberkembar Mojokerto. which affects student learning outcomes that are less than optimal.

The objectives of this study are as follows (1) To know the process of developing mnemonic-based popscra book learning media on measurement material in grade IV SDN Sumberkembar Mojokerto. (2) To determine the attractiveness of popscra book learning media based on mnemonics on measurement material in grade IV SDN Sumberkembar Mojokerto. (3) This is to determine the difference in student learning outcomes in classes using and not using popscra book media products based on mnemonic measurement material in grade IV SDN Sumberkembar Mojokerto.

The form of research carried out is to use a descriptive research form with qualitative and quantitative data analysis. The research method used is Research and Development (R & D). Researchers adapted Borg and Gall's modified development model. Of Borg and Gall's ten development steps, the researcher only applied seven research steps.

The results showed (1) the process of development and research through several stages, namely: product design, product validation, revision, and field testing (2) the attractiveness level of this popscra book media has a high attractiveness rate of 87%. This shows that the use of the media has reached attractive and valid criteria. (3) Differences in student learning outcomes based on the independent sample t-test using SPSS 20 and manually it can be concluded that  $H_1$  is accepted. Because  $t_{count}$  4.033 is greater than  $t_{table}$  2.100. This shows that the product developed by the popscra book media measurement material is effectively used. This also reinforces that the learning outcomes of students who learn using popscra book media are better than student learning outcomes who do not use popscra book.

# مستخلص البحث

سانتي ، فيفي إندانج تري . 2020. تطوير وسائط الكتاب popscra استسنادا الى فن الإستذكار على مواد القياس لتحسين النتائج التعليمية لطلاب الصف الرابع في المدرسة الإبتدائية العامة سومبير كيمبانج موجوكرطا. البحث العلمي، قسم تعلسم المعلمين بالمدرسة الإبتدائية، كلية التربية وتدريب المعلمين، جامعة مو لانا مالك إبراهيم الإسلاميّة الحكوميّة بمالانج. المشرفة: نورل نزوليا الماجيستير.

الكلمات المفتاحية: وسائط الكتب popscra ، مواد القياس ، نتائج التعليمية الطلاب .

استخدام وسائط التعلم في التعليم مهمة جدا في زيادة الدافعية والمعرفة و الفكر لدي الطلاب. ومع ذلك ، فإن أهمية توافر وسائط التعلم الجذابة لن يكون له أقصى تأثير عندما تكون وسائط التعلم في المدارس ضئيلة للغاية و يستخدم المعلمون الكتب المدرسية فقط أثناء عملية التعلم. حدث هذا في مدرسة الإبتدائية العامة سومبير كيمبانج موجوكرطا مما يؤثر على نتائج تعلم الطلاب الأقل من الأمثل.

أهداف هذه البحث هي: (1) لتحديد عملية تطوير وسائط تعلم كتاب popscra استسنادا الى فن الإستذكار على مواد القياس في الصف الرابع مدرسة الإبتدائية العامة سومبير كيمبانجموجوكرطا، (2) لتحديد جاذبية وسائط تعليم كتاب popscra استسنادا الى فن الإستذكار على مواد القياس في الصف الرابع مدرسة الإبتدائية العامة سومبير كيمبانجموجوكرطا (3) لتحديد الفروق في نتائج تعلم الطلاب في الفصول الدراسية باستخدام منتجات popscra للكتب الإعلامية و عدم استخدامها بناءً على مواد قياس الذاكرة في الصف الرابع مدرسة الإبتدائية العامة سومبير كيمبانجموجوكرطا.

هذا البحث يستخدم بحث وصفي مع تحليل البيانات النوعية والكمية. طريقة البحث المستخدمة هي البحث والتطوير (R & D) قام الباحثة بتكييف نموذج التطوير المعدل لبورج وجال. من بين خطوات التطوير العشر لبورج وجال ، طبق الباحثة سبع خطوات بحثية فقط.

أظهرت النتائج (1) عملية النطوير والبحث عبر عدة مراحل ، وهي: تصميم المنتج ، التحقق من صحة المنتج ، المراجعة والاختبار الميداني. (2) مستوى جاذبية هذا الكتاب POPSCRA بنسبة جاذبية عالية بلغت 87. وهذا يدل على أن استخدام وسائل الكتاب POPSCRA بنسبة جاذبية عالية بلغت 87. وهذا يدل على أن استخدام وسائل الإعلام قد وصل إلى معايير جذابة وصحيحة. (3) تعتمد الاختلافات في نتائج تعلم الطلاب على نموذج اختبار 1 المستقل باستخدام 10 SPSS ويمكن يدويًا استنتاج قبول 11. لأن 11 المنتج الذي تم على أن المنتج الذي تم تطويره بواسطة مادة قياس وسائط كتب 12 popscra يتم استخدامه بشكل فعال. يعزز هذا أيضًا أن نتائج التعلم للطلاب الذين يتعلمون باستخدام وسائط كتاب 13 popscra أفضل من تائج تعلم الطلاب الذين لا يستخدمون كتاب 13 popscra .

#### **CHAPTER I**

## **INTRODUCTION**

## A. Background of the Study

Education is generally seen as a concept that needs to be instilled in children from an early age. In the Act the national education system No. 20 of 2003 Article 3 states that "the purpose of education to develop students' potential to become a man of faith and fear of God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and be citizens of a democratic and responsible ".<sup>2</sup> The educational goals can be achieved through a learning process in schools. This learning has a diverse scope, one of them is the learning of mathematics.

Learning mathematics is one of the lessons learned by students ranging from primary school level to college.<sup>3</sup> Therefore, mathematics is seen as exact subjects that play an important role in various fields to cultivate students' thinking correctly. It has been proved by research that shows Rasiman the result that a series of learning activities that emphasize problem-solving in mathematics can improve students' ability to think critically, analytically, systematically and logically.<sup>4</sup> This result was also confirmed by Rosnawati research showing that mathematics will have an impact on the efficiency and automation of students' critical thinking

<sup>&</sup>lt;sup>2</sup> Undang-Undang Republik Indonesia Nomor 20 Tahun 2003 Tentang Sistem Pendidikan Nasional (Jakarta: 2003), p. 6.

<sup>&</sup>lt;sup>3</sup> Catur Supatmono, *Matematika Asyik* (Jakarta: PT Gramedia Widiasarana Indonesia, 2009), p. 1.

<sup>&</sup>lt;sup>4</sup> Rasiman, *Meningkatkan Kemampuan Berpikir Kritis Melalui Pembelajaran Matematika dengan Pendekatan Matematika Realistik. Axiom Journal*, University of PGRI Semarang. Vol. 4 No. 2 September 2013.

skills.<sup>5</sup> Therefore, it is necessary to create an interesting learning enthusiastic students learn mathematics. One of them is through the study of mathematics through the effective use of media.

The medium of learning in education proved to play an active role to improve the motivation, knowledge and intellectual learners in the learning process. This is proved by research conducted by Abiy Riabethe and Budi Astuti which showed that the effective use of media can increase students' motivation so that people can gain knowledge and insight under the purpose of learning.<sup>6</sup> Once the importance of learning media in education, in line with fulfilling the needs of students, especially at the primary level are still in the stage of concrete operations.

It is based on a cognitive theory proposed by Piaget. In the concrete operational stage, students are able to think logically about concrete events and classify objects into different shapes.<sup>7</sup> Therefore, one way to concretize the abstract mathematical concept that is by generating a learning media is directly linked to students' daily lives.

Based on observations conducted by researchers at the date of October 2, 2020, at 2020 at SDN Sumberkembar, Mojokerto Regency, most of the available learning media are dominated by science lessons, while mathematics learning media, especially the material for measuring units of length and units of weight, do not exist. The teacher only uses textbooks.

It is strengthened through interviews with fourth-grade teacher Mr. Topo, S. Pd, he said that the average student concentration only occurred 10-15 minutes at the beginning of the lesson. Meanwhile, in the learning process,

<sup>&</sup>lt;sup>5</sup> R. Rosnawati, *Berpikir kritis melalui Pembelajaran Matematika untuk Mendukung Pembentukan Karakter Siswa*, Papers Presented in National Seminar on Education, Sanata Dharma University, Yogyakarta.

<sup>&</sup>lt;sup>6</sup> Abiy Risabethe & Budi Astuti, *Pengembangan media pembelajaran untuk meningkatkan motivasi belajar dan karakter semangat kebangsaan siswa kelas V SD*. Character Education Journal, No. 1, Year. VII April 2017.

<sup>&</sup>lt;sup>7</sup> Desmita, *Psikologi Perkembangan* (Bandung: Remaja Rosdakarya, 2013), p. 35.

the teacher only uses school textbooks. The loss of media supplies in the learning process was also encouraged by the Covid-19 pandemic which required students to study at home which only relied on textbooks. So that in the learning process students feel increasingly bored and lazy to learn because of the absence of interesting media.<sup>8</sup>

In the material for units of length and weight, there is a unit ladder that students need to memorize and understand. In the process of memorizing the teacher also found the problem of students who find difficulty in remembering the sequence of unit conversions. Besides, when the students sort these units often doing some mistakes. This difficulty is often the reason students given practice or unit conversion problems during the teaching and learning process. The fatal issue brought up at the next grade level.

Of the ten students in class V SDN Sumberkembar, Mojokerto by questions regarding the material relationships between units, seven of them are not able to answer material relationships between these units. The real number of students who experienced an error in converting the relationship between the unit such as converting units from cm to km, pounds to kg or vice vers. The reality is that the answers given by students are only guesswork, but still wrong. So that the number of students who experience errors in converting the relationship between units shows that the absorption of material on the relationship between units is not meaningful in students' memories. Automatically learning of mathematics would be difficult to apply by students in everyday life. However, it can be resolved if the effective use of media in learning mathematics presented mainly on material relationships between units.

Researchers developed an interactive media that can be used by teachers to achieve the desired objectives, namely media "popscra book based on mnemonic units of length and weight ". Popscra book is a book that is used in the learning process, it can replace the unit ladder image according to

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<sup>&</sup>lt;sup>8</sup> Interview with Topo, fourth-grade teacher at SDN Sumberkembar, dated July 22, 2020.

learning needs. Popscra book media is packaged in the form of a mnemonic-based book with a similar concept to pop-up scraft book media.

The effectiveness of the use such media is corroborated by research conducted by Sepy Saparina using mnemonic-based media pocket book that shows the significance of the impact on student learning outcomes. Besides, research conducted by Jatu Pramesti in 2015 also demonstrated the feasibility of the media that are pop-up to get a decent score by experts, with the results of the analysis of the field test to get an average of 4.31 with a very good category. It shows pop-up media development is eligible to apply in the learning process. 10

From this, the researchers saw that the mnemonic-based popscra book media has never been developed for material relations between units before. Therefore, the development of popscra book media believed that the creation of learning needs to be applied by national education goals. Thus, from the entire description above researchers will conduct in-depth research with the title "The Development of Popscra Book Learning Media Based on Mnemonic Strategies on Measurement Materials to Improve Student Learning in Grade 4 SDN Sumberkembar Mojokerto".

#### B. Formulation of the problem

Based on the issues raised in the background above, can be formulated problems of research and development of instructional media popscra book mnemonic based materials measurement to improve student learning outcomes fourth-grade SDN Sumberkembar as follows:

Jatu Pramesti, Media Development Pop-Up Book theme events for class III Elementary School Pakem 1, *Thesis*, Faculty of Education, Yogyakarta State University, 2015, p. vii.

<sup>&</sup>lt;sup>9</sup> Sepy Saparina, "Effectiveness Handbook Based Retention Mnemonics Against Students with SQ3R Method in Sub Material Bone in Class XI MAN 2 Pontianak", *Thesis*, the Faculty of Education, University of Muhammadiyah Pontianak, 2016, p. 9.

- 1. How does the process of developing learning media popscra book mnemonic base on measurement material for fourth-grade at SDN Sumberkembar?
- 2. How is the attractiveness of learning media popscra book mnemonic based on measurement material for fourth-grade at SDN Sumberkembar?
- 3. How are student learning outcomes in the classroom use and not use media popscra book mnemonic based on measurement material for fourth-grade at SDN Sumberkembar?

## C. Development Objectives

Based on the background and the formulation of the problem which has been described above, the research and development objectives are:

- 1. Knowing the process of developing learning media popscra book mnemonic based on measurement material for fourth-grade at SDN Sumberkembar.
- 2. Knowing of learning media popscra book mnemonic based on measurement material for fourth-grade at SDN Sumberkembar.
- 3. Knowing the differences in learning outcomes of students in classes that use and do not use media products popscra book mnemonic based on measurement material for fourth-grade at SDN Sumberkembar.

# D. Development Benefits

In research and development, researchers hope to be able to provide usefulness and benefits to various parties. Among them:

#### 1. For Researchers

As a container or vehicle to provide insight and knowledge on the application of instructional media. Develop competencies and skills in solving learning problems. As well as to develop an effective medium of learning and fun in the learning of mathematics, especially material measurements.

#### 2. For Students

Help students understand the concept of matter, strengthen the cognitive structure, and increase the motivation to learn. Thus, the study results can be increased according to the learning objectives.

#### 3. For Teachers

It allows teachers to provide concepts, evidence, and material in mathematics. As a reference and a means of developing more effective media and enjoyable.

#### 4. For Institutions

#### a. For Agencies UIN Maulana Malik Ibrahim Malang

This research is expected to contribute actively in improving the process of development of instructional media as a form of participating to promote education in Indonesia that is effective and qualified.

# b. For Institutions SDN Sumberkembar Mojokerto

The results of the research development of instructional media are expected to be an appropriate tool to actualize the potential of children, both intellectually or spiritually. Those it can contribute to developing the learning process towards the better through the use of appropriate media and targets, delivery of information or material concepts can be conveyed, the learning process is more varied and meaningful in the lives of students.

# 5. For Developers Sciences

Expected to be a reference source or reference in developing the material math learning media measurement.

# **E.** Assumptions Development

#### 1. Assumptions Development

The assumption underlying the researchers conducted this research and development is expected through the book-based learning media popscra mnemonic students can develop patterns of memory in understanding a concept of early material. On the other hand, it is expected

to meet the needs of students to be more motivated mentally and foster a sense of interest in the subjects of mathematics that increase student learning outcomes.

## 2. Limitations of Development

The development of learning media popscra book mnemonic based is limited to the material measurement of the relationship between the unit of length and unit mass in class IV SD/MI. The object of research is limited to the use of instructional media at SDN Sumberkembar Mojokerto Regency.

## F. Development Scope

The scope of this developing research, developing manipulative learning media in the form of a popscra book mnemonic based on material units of length and weight in SDN Sumberkembar, Mojokerto Regency. The media is limited to visual media in the form of pop-scraft books, which are concept books

Learning media developed by researcher to improve student learning outcomes in learning through strategies to understand and memorize. So that strategy can strengthen your memory and find out more about the material measurement.

#### **G. Product Specifications**

Products produced in the development of this form of learning media in the form of a popscra book which contains materials measurement of the relationship between the unit of length and unit weight. Specifications instructional media forms such popscra books namely:

1. The physical form of the resulting media is in the form of printed media in the form of books. Designed using the art of pasting patterns. pay attention to variations in pattern layout, layout, color choices, image choices, and variations of letters that appear to arise according to needs. Each pattern is used to load material, conversion tables, measuring instrument drawings.

Meanwhile, the individual ladder is designed with sticky art embossed with familiar cartoon characters in everyday life. The pattern is designed in a minimalist and simple way. Equipped with a unit reminder sentence that students can easily understand when remembering the unit sequence.

- 2. The presentation of the material covered on the relationship between the unit of length and mass units are designed using a mnemonic to support learners' memory.
- 3. In using popscra-book learning media, it is equipped with instructions for use.

## H. Originality of the Product

In the study of this development, there are some previous studies conducted previously. This is done for each plan research to be conducted does not contain elements of plagiarism and is based on originality. Here are some previous studies:

1. The results of a study entitled "Measurement Board Media Development Unit Length and Mass Unit to Improve Learning Outcomes Mathematics" by Ana Masyitoh (2014) indicates that the media is also worth a measurement board for getting a valid acquisition value. In terms of the process and the results of this board can provide the media as well as helping students to achieve the learning objectives. Differences in research and development by the researcher in the development of instructional media measurement stairs, while the researchers developed a learning medium popscra book mnemonic based measurements. Besides equality of both research and development is taking material about the material on the focus measurement unit length and unit of mass and the object of study in class IV.

Ana Masyitoh, "Pengembangan Media Papan Pengukuran Satuan Panjang dan Satuan Massa untuk Meningkatkan Hasil Belajar Matematika, *Thesis*, Tarbiyah and Teaching Training Faculty, Maulana Malik Ibrahim State Islamic University of Malang, 2014, p. 5.

- 2. The results of the study, entitled "Improved Learning Outcomes Mathematics Content Measurement (Unit Length) Through the method of Problem Based Learning in Grade IV MI Keputon Blado Batang District of School Year 2015/2016" by Anny Maftukhah (2015) show that through Problem Based Learning method can improve mathematics learning outcomes measurement unit length material. Differences of this study by researchers are participating in classroom action research, in which researchers directly involved in the research process from beginning to end and use the time of the study consisted of 3 cycles. Moreover, the equation of the two studies that use the measurement of the materials (unit of length and unit of mass) and the object of study in class IV.
- 3. The results of the study entitled "Learning Media Development Straight Line in the Material Measurement Unit Length Grade III Elementary School" by Sandrita Rusdiana Goddess (2016) indicates that the media unit of length measurement board is very feasible with the acquisition of valid values. <sup>13</sup> In terms of the development model using descriptive models. Differences in research that are developing measurement board shaped media in improving the students' understanding of class III. While the similarities which take measurements on the material length.
- 4. The results of the study entitled "Development of Domestic Media Conversion Unit for Mathematics Education in Elementary Students About Measurement Class IV" by Auwwalin Khoirunnisa (2018) showed that the product development of this form of media conversion staircase fit

<sup>12</sup> Anny Maftukhah, "Peningkatan Hasil Belajar Matematika Materi Pengukuran (Satuan Panjang) Melalui metode *Problem Based Learning* pada Siswa Kelas IV MI Keputon Kecamatan Blado Kabupaten Batang Tahun Pelajaran 2015/2016, *Thesis*, Tarbiyah and Teaching Training Faculty, IAIN Salatiga, 2015, p. ix.

<sup>&</sup>lt;sup>13</sup> Sandrita Rusdiana Dewi, "Pengembangan Media Pembelajaran Straight Line pada Materi Pengukuran Satuan Panjang Siswa Kelas III Sekolah Dasar", Thesis, the Faculty of Education, University of Muhammadiyah Malang, 2016, p. viii.

for use.<sup>14</sup> Differences in research and development by the researchers is that the media developed in the form of three-dimensional media are packed in concrete form. While this popscra book instructional media including three-dimensional media, but is packaged in a popscra book to improve student learning outcomes. The equation is the materials that were developed a material with the measurement object class IV study.

Table 1.1 Originality of Research

No	Researcher Name, Title, Forms (Thesis/Journals) Publisher, And Years Of Research	Equation	Difference	Originality Research		
1.	Ana Masyitoh, Media Development Board Unit Measurement Unit Length and Mass To Improve Learning Outcomes Mathematics, Thesis, State Islamic University of Malang Maulana Ibrahim Malikk, 2014	The focus of the material in the material units of length and mass, and aims to improve student learning outcomes	The development of such media measurement board	Development of book-based media in the form of popscra mnemonic		
2.	Anny Maftukhah, Improved Learning Outcomes Mathematics Content Measurement (Unit Length) Through the method of Problem Based Learning In Grade IV MI Keputon Blado District of Batang in the school year 2015/2016, Thesis, IAIN Salatiga, 2015	Using the measurement of material (unit of length)	Using an action research method with learning methods PBL (Problem Based Learning)	The research method using the method of research and development that produces the popscra book learning media used in the measurement of the material,		
3.	Sandrita Rusdiana Goddess, Learning Media Development Straight Line in the Material Measurement Unit Length Grade III Elementary School, Thesis, University of Muhammadiyah Malang, 2016	Using material measurement unit length	Development of instructional media Straight Line which aims to enhance students' understanding of the subject of research of class III Elementary School	Popscra book-based media development mnemonic to improve student learning outcomes with the research subjects in class IV SDN Sumberkembar Mojokerto		
4.	Auwwalin Khoirunnisa, Stairs Media Development Unit Conversion to Learning Mathematics in Elementary Students About Measurement Class	Development of instructional media materials measurement	Produce such as media conversion ladder unit which aims to	The products with instructional media materials measurement popscra book that		

Auwwalin Khoirunnisa, "Pengembangan Media Tangga Konversi Satuan untuk Pembelajaran Matematika Tentang Pengukuran Pada Siswa SD Kelas IV", *Thesis*, the Faculty of Education, State University of Malang, 2018, p. viii.

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Γ	IV, Thesis, University of Malang,	improve	aims to improve
	2018.	understanding of	student learning
		the concept on	outcomes fourth-
		the relationship	grade SDN
		between units.	Sumberkembar
			Mojokerto

# I. Key of Terms

# 1. Media Learning of Popscra Book

Media is an intermediary or an introductory, instructional media in education is defined as tools or materials used to convey the information, messages or content of the material. Learning media are all tools that serve as intermediaries in the learning process. Thereby providing ease in achieving the learning objectives. Besides the learning media designed to support learners' thinking skills.

Popscra book stands for a pop-scraft book. The book referred to in this development research is a book containing material for units of length and weight. In accordance with its name, popscra book is a book designed using a combination of the art of pasting patterns and images that can display embossed shapes. This form can be enjoyed when opening the paper arrangement (stacked) contained in the paper pages.

#### 2. Measurement

Measurements according to Big Indonesian Dictionary (KBBI) is a process, method or action measure. The term measure itself would be to calculate the size (length, breadth, width, big time,) and so on. It can be concluded that the measurement of a process or method to calculate the size (length, breadth, width, big time,) is used as a determination of the scale, dimension or capacity to a standard or unit of measurement.

One of them is the unit of measurement unit of length and unit of mass. The unit of length is a length that consists of raw unit length and unit

 $<sup>^{15}</sup>$  Jamil Suprihatiningrum,  $\it Strategi$   $\it Pembelajaran:$   $\it Teori & Aplikasi$  (Jogjakarta: Ar-Ruzz Media, 2017), p. 319.

length is not standardized. Standard unit length of the meter or commonly denoted by the letter m. The meter is the basic unit of length in the matrix system. Unit sequence lengths ranging from kilometers (km), hectometer (hm), decameter (dam), meters (m), desi meters (dm), centimeters (cm), millimeter (mm). Each of these names has a relationship with the meter.

Unit of mass is the unit used to measure the weight. The units on the masses if sorted starting from kilogram (kg), hectograms (hg), decagrams (dag), gram (g), desi gram (dg), centimeter gram (cg), milligrams (mg). Each unit mass of names of links to the gram.

#### 3. Mathematics

Mathematics is common knowledge that has many branches as well as the basis for the emergence of new disciplines. Contain exact science and analysis that contains ideas, facts, concepts, principles, relationships and operational procedures used to solve problems in everyday life.

#### 4. Mnemonics

Mnemonics is a technique in learning to use coding to absorb the information or subject matter. To assist and facilitate the process of remembering and understanding a theoretical and practical knowledge in the learning process.

# 5. Learning Outcomes

The learning result is an alloy composed of two words "results" and "learning". The results can be interpreted as an acquisition. While learning is a process of interaction between an individual (students) against all the existing situation to achieve goals. <sup>16</sup>

According to Bloom's theory, learning outcomes represents a change in the behavior shown in the three domains, namely cognitive, affective, and psychomotor levels a long with its aspects.<sup>17</sup>

 $<sup>^{16}</sup>$ Rusman, *Pembelajaran Tematik Terpadu: Teori, Praktik, dan Penilaian* (Jakarta: Rajawali Pers, 2015), p. 11.

<sup>&</sup>lt;sup>17</sup> *Ibid.*, p. 18.

The third domain of being the object of assessment of learning outcomes. But among the third realm, the cognitive realm has the most ratings by teachers at school, because given the cognitive domains related to the ability of the students to master the subject matter.<sup>18</sup>

It can be concluded that the learning outcomes represents a change in individuals (students) in the realm of cognitive, affective and psychomotor after the process of the interaction of all the existing situation to achieve the desired objectives.

# J. Systematic of the Writing

Systematics of writing in development research is divided into six chapters. The description of each of these chapters are:

Chapter I (introduction) this chapter, discusses the description of the problem which consists of background, formulation of the problem, development goals, development benefits, assumptions development, scope of development, product specifications, originality of research, definition of operations, and systematics discussion.

Chapter II (literature review) this chapter, discusses the theoretical basis consisting of development, learning media, mathematics learning primary schools/islamic elementary schools, media popscra book, measurements, and learning outcomes.

Chapter III (Research methods) this chapter, discusses the development of research methods consisting of type of research, development model, development procedure, product test.

Chapter IV (development results), in this chapter, describes the results of product development which consist of popscra book media development process, the attractiveness of popscra book learning media, and differences in the results of trials of popscra book media products.

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 $<sup>^{18}</sup>$ Nana Sudjana,  $Penilaian\ Hasil\ proses\ Belajar\ Mengajar$  (Bandung: PT Remaja Rosdakrya Offset, 2017), p. 23.

Chapter V (discussion) in this chapter, describes the discussion of the popscra book media which consists of a discussion of the development process of the popscra book media, the attractiveness of the popscra book learning media, and the differences in the results of the popscra book media product trial.

Chapter VI (closing) this chapter, describes the closing which consists of conclusions and suggestions.



#### **CHAPTER II**

#### LITERATURE REVIEW

#### A. Literature Review

#### 1. Development

Increasingly rapid progress of time to support their development processes continue to emerge. According to the laws of the Republic of Indonesia, Number 18 of 2002 is the meaning of development activities in science and technology that aims to use the principles and theories of science-proven to improve the quality of various aspects of both the benefits of functions and applications has resulted in new technology.<sup>19</sup>

Their development is intended as an attempt to modernize work, products or knowledge that is tailored to the needs and circumstances of the moment. According to Setyosari, the notion of development is a process used to develop and validate the educational product. The development can be a process, product, or design in the field of education is based on the findings, through the stages of the testing of field trials under the background where the product will be used as well as make improvements to the field test results.<sup>20</sup>

In essence, the development interpreted as an attempt to enhance existing products that can be accounted for, the product can be shaped hardware (hardware) or software (software). Hardware such as books and instructional media modules in the learning process. While software such as

<sup>&</sup>lt;sup>19</sup> Undang-undang Republik Indonesia Nomor 18 tahun 2002 tentang Sistem Nasional Penelitian, Pengembangan, dan Penerapan Ilmu Pengetahuan dan teknologi (Jakarta: 2002), p. 3.

<sup>&</sup>lt;sup>20</sup> Punaji Setyosari, *Metode Penelitian Pendidikan* (Jakarta: Kencana, 2012), p. 222-223.

computer programs for data processing, library, evaluation, learning outcomes, and so forth.<sup>21</sup>

Based on the explanation above, it can be interpreted that development is a conscious effort in the field of science by doing process improvement products or create new products that can be used after going through the stages of product validation. So that the product has been enhanced to feasible and effective for use in accordance with the purpose of learning.

#### 2. Instructional Media

## a. Definition of Media Learning

The word comes from the Latin media medius that is the middle, intermediary, or introduction.<sup>22</sup> In the Arabic language media called "wasail" the plural of wasilah ie synonyms of al-wasth which means middle. The word "middle" is synonymous as an introduction or a liaison, which means delivering or connecting or channeling something from one side to the other side (an introductory message from the sender to the recipient of the message).<sup>23</sup>

In the world of education and learning, the media interpreted as an introduction or an intermediary from the sender to the receiver, a tool that brings information or subject matter that aims to provide convenience in achieving the learning objectives.<sup>24</sup> Therefore, through the effective use of media that will support the success in the learning process.

<sup>&</sup>lt;sup>21</sup> Nana Syaodih Sukmadinata, *Metode Penelitian Pendidikan* (Bandung: Pt Remaja Rosdakarya: 2016), p. 321.

 $<sup>^{22}</sup>$  Sutirman,  $Media\ dan\ Model-Model\ Pembelajaran\ Inovatif$  (Yogyakarta: Graha Ilmu, 2013), p. 15.

<sup>&</sup>lt;sup>23</sup> Munadi Yudhi, *Media Pembelajaran* (Jakarta: GP Press Group, 2008), p. 3.

 $<sup>^{24}</sup>$  Jamil Suprihatiningrum,  $Strategi\ Pembelajaran\ Teori\ dan\ Aplikasi$  (Jogjakarta: Ar-Ruzz Media, 2017), p. 319.

Based on the description above, the media is anything that can connect, convey messages or information on the source or sender to the recipient to achieve the expected goals. While learning media is everything used by educators to convey information or learning materials for learners to achieve the learning objectives that can support the success of learners in the learning process. Therefore, the media interesting and creative learning is highly recommended in the learning process, given the influence and the benefits are so great in the perception of the concept or the subject matter.

#### b. The Characteristics of Instructional Media

In the book by Azhar Arsyad wrote that Gerlach and Ely suggest three media characteristics that are clues to why some media used and what can be done when the teacher is less efficient media do.<sup>25</sup>

#### 1) Feature Fixative

These characteristics describe the media's ability to record, store, preserve, and construct an event or object. Genesis or the object can be sorted and rearranged with media such as photography, videotape, audiotape, computer diskettes, and movies. Therefore, events or objects can be recorded or photographed by the camera then produced anytime. Through this fixative characteristics, media allows a shooting or recording at a specific time and transported without knowing the time.

#### 2) Feature Manipulative

These characteristics describe the ability of the media in presenting information in manipulative. This means that events or objects that have been recorded or captured image can be displayed quickly, or slowly through the editing process. Manipulation events or objects by editing can make a proper time. So that the media can be edited by the teacher by showing the necessary parts,

<sup>&</sup>lt;sup>25</sup> Azhar Arsyad, *Media Pengajaran* (Jakarta: PT Raja Grafindo, 1997), p. 12.

workmanship requires earnest attention, because if something goes wrong in the rearrangement, or the sequence of events as well as cutting the wrong part. There will be also an error of interpretation of the information submitted.

#### 3) Feature Distributive

These characteristics describe the media capabilities in transporting the object or event through space, and simultaneously the object or the incident presented to several students with the same stimulus relative experience of the objects or events. Through this distributive characteristic of the media can be spread all over the place you want anytime. Not only through one or several school classes only. But also how times can be reproduced at any time and ready to be used simultaneously in different places or used over and over again somewhere. Secured consistency of information and almost identical to the original.

#### c. Functions and Benefits of Learning Media

The main function of the learning media as a teaching aid that also affects climate, conditions, and learning environment that is set up and created by teachers.<sup>26</sup>

According to Levie and Lentz in the book by Azhar Arsyad argues that there are four functions namely instructional media attention function, the function of affective, cognitive, compensatory function. The following describes in detail each of these functions:

1) Attentional function means learning media serves to attract and direct attention to the students to listen and concentrate on the subject matter displayed or text accompanying the study. This is because often students, when initial learning is not interested in the subject matter and indifferent towards learning, therefore through this medium teacher cultivate the spirit and direct student attention

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<sup>&</sup>lt;sup>26</sup> Ibid, p. 15.

- on the material to be delivered. That allows students to obtain a more comprehensive and remember the material.
- 2) Affective function means learning media can be seen from the comfort phase students in acquiring the lessons, read display text or visual symbol. Image or visual symbol that is displayed through the learning media can arouse emotions and attitudes.
- 3) Cognitive function means that when media that contains the subject matter is presented in an interesting situation, to facilitate the achievement of the goal of understanding and remembering information or messages contained in the subject matter.
- 4) Compensatory function means that when students have weaknesses in reading and hard to understand the text, then the learning media enables students to understand the content of the lessons are presented with text.

In addition to the above media functions, the use of instructional media has benefits, especially namely to help students learn the contents of the subject matter. The shape of the relationship between students and the media is very influential in the delivery of the concept or the material presented by the teacher. Here are some benefits of learning media in the learning process of students:<sup>27</sup>

- 1) Through the use of appropriate instructional media, varied and interesting can overcome passivity, indifferent to the students.
- 2) Assist teachers in presenting the subject matter, to make the perception of the concept or subject matter that is received by the students.
- 3) Increasing the concentration of students in accepting the concept or the subject matter.

<sup>&</sup>lt;sup>27</sup> Arief Sadiman, Media Pembelajaran dan Proses Belajar Mengajar, Pengertian Pengembangan dan Pemanfaatannya (Jakarta: Raja Grafindo Persada, 2002), p. 16.

In addition, according to Azhar Arsyad their use of media has some practical benefits to the learning process which is as follows:<sup>28</sup>

- Clarifying the presentation of information and messages so that the learning process becomes smooth, processes and increasing student learning outcomes.
- 2) Help improve and direct the students' attention, causing the motivation to learn, individual interaction with the environment directly.
- 3) Overcoming the limitations of the senses, space and time.
- 4) Provide a common experience of the events in their environment.

  To create interaction between students and teachers, society and the environment.

From the description and the opinion of some experts about the functions and benefits of learning media above, it can be concluded that the media has the functions and benefits that meet the goals of teaching where Opera- contained in the media should engage students physically and mentally that is designed in the form of real activity. Not only attractive and able to please a student, but the media can provide an enjoyable experience and meet the individual needs of the students in understanding the material or the concept more easily, thus the learning process can be accomplished by the purpose of learning.

#### 3. Learning Mathematics in Elementary Schools

#### a. Definition Mathematics

Mathematics in English is derived from the word meaning knowledge mathema, mathanein means to think or learn. Based on the original saying, math means a science and thinking (reasoning), which

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<sup>&</sup>lt;sup>28</sup> Azhar Arsyad, *Media Pengajaran* (Jakarta: PT Raja Grafindo, 1997), p. 26.

emphasizes on the ratio and not on the results of the experiment or observation results.<sup>29</sup>

Some experts expressed the math-challenged the definition of which is as follows:

1) According to Sri Anitah definition of mathematics is not defined easily and stay. This happens because of the function and role of mathematics in other subjects. If there are several definitions of mathematics then it is only tentative, that depends on who is defining it. Here is a summary of mathematical understanding based on these considerations:<sup>30</sup>

Branch knowledge of exact and organized, deductive science of the scope or measurement and layout, about the number of numbers and relationships, ideas, structures, arranged according to a logical sequence, the structure of the logic regarding the form organized on the composition of scale and concept a concept from the elements that are not defined to a defined element, which begins axioms or postulates then to postulate or theorem, and is divided into three areas namely algebra, analysis, geometry.

- 2) According to Ismail et al revealed that mathematics is a science which deals with numbers and calculations, numerical problems, the quantity scale, studied the relationship patterns, shapes, and structures, means of thinking, a collection of systems, structures, and tools.<sup>31</sup>
- 3) According to Rusefendi, mathematics is a deductive science that means a collection of some of the elements that are not defined, the

<sup>&</sup>lt;sup>29</sup> Fatrima Santri Syafri, *Pembelajaran Matematika; Pendidikan Guru SD/MI* (Yogyakarta: Tajuk Entri Utama, 2016). p. 8.

<sup>&</sup>lt;sup>30</sup> H. M Ali Hamzah & Muhlisrarini, *Perencanaan dan Strategi Pembelajaran Matematika* (Jakarta: Rajawali Pers, 2014), p. 47.

<sup>&</sup>lt;sup>31</sup> Ibid., p. 48.

definitions, axioms, and postulates, where the argument as unsubstantiated, it can be generally applicable.<sup>32</sup>

Based on exposure to the experts about the mathematical definition, it can be seen that mathematics is common knowledge that has many branches as well as the basis for the emergence of new disciplines. Contain an inexact science and substantially containing ideas, facts, concepts, principles, relationships and operational procedures used to solve problems in everyday life.

## b. Learning Mathematics

Learning math is a process of functional communication between students and teachers, students and students, students with the environment to construct the attitude and mindset of the students so that students have the ability, knowledge and mathematical skills. So that students are able to deal with life changes that had been developed.<sup>33</sup> The process of functional communication is important in teaching and learning. Collaboration between the two is expected in a study to create effective learning, and conducive and pleasant.

Learning is a process of integration of psychology and educational perspective that changes in behavior (cognitive and affective) that is positive.<sup>34</sup> Where both are interrelated and are used as a field of study on learned behavior. Besides, the study by Bell Gretler in Winataputra S. Udin is a process performed by humans in order to get a variety of competencies, skills, and attitudes.<sup>35</sup> Additionally,

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<sup>&</sup>lt;sup>32</sup> Erna Suwangsih dan Tiurlina, *Model Pembelajaran Matematika* (Bandung: UPI Press, 2006)), p. 4.

<sup>&</sup>lt;sup>33</sup> Fatrima Santri Syafri, *Pembelajaran Matematika; Pendidikan Guru SD/MI* (Yogyakarta: Tajuk Entri Utama, 2016). p. 24.

<sup>&</sup>lt;sup>34</sup> H. M Ali Hamzah & Muhlisrarini, *Perencanaan dan Strategi Pembelajaran Matematika*, (Jakarta: Rajawali Pers, 2014), p. 11.

<sup>&</sup>lt;sup>35</sup> Udin S Winataputra, *Teori Belajar dan Pembelajaran (Jakarta:* Universitas Terbuka, 2007), p. 1.4-1.5.

strengthened also by the opinions Gagne who emphasized that learning as an effort for someone to gain the insight, knowledge, skills through instruction.<sup>36</sup>

Therefore, by studying one can determine its ability to accept all the insight, knowledge, and skills that can give birth to a variety of competencies, skills, and attitudes. With their experience or an exercise resulted in a change in behavior on the individual in terms of cognitive, affective, and psychomotor. The experience is the result of students' memory of the previous learning process with the conditions in their environment. It is said to be a theory of transformation.

Theory transformation is stored as long-term memory and short term. Long-term memory requires a process called encoding. In mathematics encoding matrix in the form of tables, diagrams, symbols, and detailed drawings of the information received.<sup>37</sup> Therefore, to enter into long-term memory requires a material that is semantics which connects a symbol with things that are integrated and meaningful. One was the study of mathematics.

Learning math is a process of change in behavior of the cognitive, affective, and psychomotor fields of study that are in all levels of education, who have a learning goal that is not only able to use Mathematics but also gains the ability to think in implementing it. So students should be able to process and understand all the concepts, ideas, structure, and relations concepts and how to apply them.

#### c. Characteristics of Mathematics in SD/MI

Mathematics in primary school not far from the abstract nature of mathematics. Inversely proportional to the nature of the students' progress in the SD/MI at the stage of concrete operations. According to

<sup>&</sup>lt;sup>36</sup> Susanto Ahmad, *Teori Belajar dan Pembelajaran* (Jakarta: Prenada Media Group, 2013), p. 1.

<sup>&</sup>lt;sup>37</sup> H. M Ali Hamzah & Muhlisrarini, *Perencanaan dan Strategi Pembelajarab Matematika* (Jakarta: Rajawali Pers, 2014), p. 12.

Piaget's concrete operational phase occurs at 6 to 11 years. In this phase, the child has the ability to think logically.<sup>38</sup> Therefore, the need for knowledge about the characteristics of mathematics, namely the following: <sup>39</sup>

## 1) Learning Math Using Spiral

In this spiral method of learning Mathematics delivered by linking the concept to be studied with the earlier concept. Thus, to be able to learn and understand the concepts to be discussed, then the teacher made the previous concept as a prerequisite.

## 2) Learning Mathematics Gradually

Mathematical material delivered in stages, meaning that the material presented starting from simple concepts to the more difficult concepts, learning is done by understanding the concepts in a concrete, semi-concrete, to the abstract concept.

# 3) Learning Math Using an Inductive Approach

In Mathematics presentation topics or materials developed based on the premise that the inductive, meaning that the material supplied concrete to the abstract, from the particular to the general, from the examples to conclusions.

#### 4) Learning Mathematics Embrace the Truth of Consistency

Truth on the consistency of mathematics, which means that concepts or ideas and relationships in mathematics there is no contradiction between the truth of the other truths.

# 5) Mathematics Learning Should Be Meaningful

Learning Math is done significantly, meaning that the mathematical material conveyed through examples of which are located around the student environment. So that the material given

<sup>39</sup> Abdul Halim Fathani, *Matematika Hakikat dan Logika* (Yogyakarta: Ar-Ruzz Media, 2009), p. 25.

<sup>&</sup>lt;sup>38</sup> Robert E. Slavin, *Psikologi Pendidikan: Teori dan Praktek*, translation., Marianto Samosir (Jakarta: PT Indeks, 2011), p. 45.

to students can bring influence in his life, in the hope can be applied in their daily lives.

Mathematics has an abstract concept, thus why a teacher should be able to communicate by providing reinforcement that can be understood by students. For this purpose, the learning of mathematics should be tailored to the characteristics of elementary school students, in order to create meaningful learning in life, through the use of objects that can help students to remember and understand mathematical concepts.

## 4. Popscra Book Media

Popscra book stands for pop-scraft book. Consists of two terms, namely pop and scraft. The word pop is an uptake of the pop-up book type, while scraft is a scraft book. The two words are made into one name, namely scraft or pop-scraft book.

According to an observer as well as a professional figure in the field of paper engineering, Rubin in Febrianto's writing stated that a pop-up is an illustration in which when the page is opened, drawn, or lifted, a level will arise with a three-dimensional impression.<sup>40</sup>

Meanwhile, the scraft book comes from the word scraft, which means waste, but making a scraft book is not just sticking from scraft. The definition of a scraft book is the art of sticking a photo or image on a paper and decorating it into a creative work or media. <sup>41</sup> Thus, it can be concluded that the pop- scraft book is the art of pasting an image or photo on a paper that has a pattern or part that can be moved and has an embossed shape or pattern.

<sup>&</sup>lt;sup>40</sup> M. Fatchul, Febrianto, Penerapan Media dalam Bentuk Pop-Up Book pada Pembelajaran Unsur-Unsur Rupa untuk Siswa Kelas 2 SDNU Kanjeng Sepuh. Art Education Journal, State University Surabaya Vol. 2, No. 3, Year 2014.

<sup>&</sup>lt;sup>41</sup> Luciana, Suriya Putri, *Pembuatan Software Mendesain Tampilan Scrafbook Untuk Anak Remaja.* Student Scientific Journal, Surabaya State University, Vol. 3, No. 1, 2014.

The book referred to in this development research is a book containing material for units of length and weight. In accordance with its name, Popscra book is a book designed using a combination of the art of pasting patterns and pictures or photos that can display embossed shapes. This form can be enjoyed when opening the paper arrangement (stacked) contained in the paper pages.

Designed using the art of pasting patterns. pay attention to variations in pattern layout, layout, color choices, image choices, and variations of letters that appear to arise according to needs. Each pattern is used to load material for units of length and weight, conversion tables for units of length and weight, as well as pictures of measuring instruments for units of length and weight. Meanwhile, the individual ladder is designed with sticky art embossed with familiar cartoon characters in everyday life. The pattern is designed in a minimalist and simple way. Equipped with a unit reminder sentence that students can easily understand when remembering the unit sequence.

#### 5. Measurement

#### a. Definition of Measurements

Definition of the measurement often raised by some experts. According to Roebyanto an activity comparing measurements of a quantity is measured by a measuring tool known as a unit.<sup>42</sup> Besides that, according to a measurement Untoro compare something that is measured in comparison to predetermined.<sup>43</sup> The second is based on these opinions, it can be concluded that the measurement of an activity or a process of comparing an object that is used as the determination of the scale, dimension or capacity to a standard or unit of measurement.

<sup>43</sup> J. Untoro, *Buku PIntar Matematika untuk SD Kelas 4,5*, & 6 (Jakarta: Wahyu Media, 2013), p. 129.

<sup>&</sup>lt;sup>42</sup> Goenawan Roebijanto, *Gemoetri, Pengukuran dan Statistik* (Malang: Gunung Samudera, 2014), p 83.

Also introduced in the measurement unit and quantity terms. The quantity that is something that can be measured and can be expressed numerically. While the comparison unit. For instance, the carpenter conducts a length measurement table with a pencil. From these examples, it means carpenter comparing the length of a long table with a pencil. The length of the pencil used by a carpenter called as a unit because of the position of the pencil as a comparison. The units of measurement considered in default if the unit, when used by anyone, will achieve the same measurement. For instance, 30 cm is the length measurement results, then twenty-based as numbers and cm as a standard unit.

Furthermore, the measurement consists of a measurement standard and nonstandard measurement. The standard measurement is the standard unit of measurement using measuring devices that are equipped with standard unit numbers, such as rulers, and scales. Meanwhile, not a standard measurement that measurement using nonstandard units measuring devices are equipped with several nonstandard units. These objects are often found in the environment around them. Such as hands, feet, and inches.

This is commensurate with Abdussyakir opinion stating that in everyday life, measurement includes measurements of length, time, weight, area, volume, speed, discharge. While in communities still use the units of measure are in traditional or local appropriate. For example fathoms, span, or feet.<sup>44</sup>

So from the translation of the above opinion can be concluded that the measurement of an activity comparing an object or objects that generate the numbers and units.

b. Intergovernmental Relations Unit Length and Mass

<sup>44</sup> Abdussyakir, *Ketika Kiai Mengajar Matematika* (Malang: UIN-Malang Press, 2017), p. 130.

In the international system of units, each unit has a size type basis. For the unit of length is the meter or commonly denoted by the letter m. Unit sequence lengths ranging from kilometers (km), hectometer (hm), deca-meter (dam), meters (m), desi meters (dm), centimeters (cm), millimeter (mm). Each of these names has a relationship with the meter. Because the meter is a benchmark or standard unit of length. Can be described as follows:

Table 2.1 Meters Long with a Unit Conversion

No	Unit Length	<b>Conversions to Meters</b>
1.	Km	1000
2.	Hm	100
3.	Dam	10
4.	M	0
5.	Dm	1/10
6.	Cm	1/100
7.	Mm	1/1000

The relationship between the unit of length when used as the unit of length value which is as follows:

## Picture 2.1 Value Unit Long

Units of mass are the unit used to measure the weight. The units on the Weight if sorted starting from kilogram (kg), hectograms (hg), decagrams (DAG), gram (g), desi gram (dg), centimeter gram (cg), milligrams (mg). Each unit mass of names of links to the gram. Can be described as follows:

Table 2.2 Conversion of Unit Weight with Gram

No	Unit Mass	Conversion to g
1.	kg	1000
2.	hg	100
3.	dag	10
4.	g	0
5.	dg	1/10
6.	cg	1/100
7.	mg	1/1000

Relations between unit mass when used as the value of a unit mass which is as follows:

1 kg = 10 hg = 100 dag = 1.000 g = 10000 dg = 100,000 cg = 1,000,000 mg

Picture 2.2 Value Unit Weight

# 6. Mnemonics

#### a. Definition of mnemonic

Mnemonics in Complete Dictionary of Psychology is an art in the brain to improve memory through the aid. 45 According to Shah Muhibbin mnemonic is a specific way which is used as a memory hook tool to insert points of information into the mind of students. 46 Purnamasari Rica commensurate with the opinion that suggests that the mnemonic is a way to remember information by associating the words, images, ideas or ideas well. 47

Of opinions as well as the description above, it can be concluded that the strategy of mnemonics is a trick or way the teacher to help retain

<sup>&</sup>lt;sup>45</sup> James P. Chaplin, *Kamus Psikologi* (Jakarta: PT. Raja Grafindo Persada, 2011), p. 307.

<sup>&</sup>lt;sup>46</sup> Muhibbin Syah, *Psikologi Belajar* (Jakarta: Logos Wacana Ilmu, 2013), p. 179.

<sup>&</sup>lt;sup>47</sup> Rika Purnamasari, *Strategi Pembelajaran Mnemonik Untuk Meningkatkan Memori Siswa*, Jurnal Sipatahoenan, University of Indonesia, Vol. 4 No. October 2nd, 2018.

and recall information in large quantities or less, and in the short or long term. So that when the system is required then the memory can respond well to be delivered.

#### b. Various Methods in Mnemonic

Mnemonics have various methods of implementation. The following describes the various methods that can be used in mnemonic:

#### 1) Method of Loci

Loci word comes from the Greek language, meaning that location. These loci methods instructed to prepare students in the imagination or the way of something that will be remembered to be stored in a recognized location. For instance, students should remember some information, they can mentally visualize indoor putting their home as an entrance, dining room, kitchen and so on. When students need them can recall the information, they can imagine a house, and then they take the information or learning concept.

#### 2) Method Keyword

This method is instructed to make a list of keywords for associated both with a list of facts learned by the students. For instance, for a given unit of time such as seconds, minutes, and hours. It should be made the key words in an object that is at the clock that unit time wall clock has the second minute and an hour.<sup>49</sup>

#### 3) Acrostic Method

Acrostic method is a series of words, lines or poems whose first or last letters to form a word or sentence. Or also known as a method of remembering to take out each letter of each word, then are combined to momentum letter abbreviation or stories everyday

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<sup>&</sup>lt;sup>48</sup> Eric Janson, Guru Super & Super teaching (Jakarta: PT Indeks, 2010), p. 139.

<sup>&</sup>lt;sup>49</sup> *Ibid.*, P. 140.

environment.<sup>50</sup> For instance, remember the rainbow using the acrostic "MEJIKUHIBINIU", red, orange, yellow, green, blue, indigo, and violet.

## 4) Acronym Method

This method is the creation of new words from the first letter of a series of words that must be learned.<sup>51</sup> For example, according to NASA, space agencies in the United States. Stands for National Aeronautics and Space Administration. This method sometimes also includes the word both to make it easier to remember and read like JABODETABEK.

# 7. Learning Outcomes

## a. Definition of Learning Outcomes

Learning outcomes are the abilities possessed by students after receiving their learning experience.<sup>52</sup> The results of this study as a tool or an object program of assessments aimed to determine the success of a process or activity of learning. Through this assessment, a teacher can know the results of a student's learning.

This is similar to Nana Sudjana opinion about the assessment, the effort or action to see the extent to which the stated goals can be achieved or not. The destination is about the success of the process and student learning outcomes.<sup>53</sup> Therefore, assessment and learning

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<sup>&</sup>lt;sup>50</sup> Bruce Joyce, dkk, *Models of Teaching (Model-model Pengajaran)* (Jogjakarta: Pustaka Belajar, 2011), p. 239.

<sup>&</sup>lt;sup>51</sup> Diane Ronis, *Pengajaran Matematika Sesuai Cara Kerja Otak* (Jakarta: PT Indeks, 2009), p. 142.

<sup>&</sup>lt;sup>52</sup> Masnur Muslich, *Penilaian Berbasis Kelas dan Kompetensi* (Bandung: Redlika Aditama, 2011), p. 38.

<sup>&</sup>lt;sup>53</sup> Nana Sudjana, *Penilaian Hasil Proses Belajar Mengajar* (Bandung: PT Remaja Rosdakarya, 2017), p. 22

outcomes are a unity that cannot be separated. Learning outcomes can be known by students and teachers through an assessment.

Thus, it can be concluded that the learning outcomes are several behavioral changes that include cognitive, affective, and psychomotor owned by students after undergoing a process of learning. To determine the learning outcomes required a vote. So the assessment of learning outcomes is a process of giving value to certain criteria to changes in student behavior after learning activities.

## b. Factors that Influence Learning Outcomes

The results of the study essentially about behavioral changes in individuals after a learning activity. The results of the study obtained from the interaction of various factors. Both external factors and internal factors. Here are the factors that can affect learning outcomes:

#### 1) External Factors

External factors are factors that come from outside the individual contained in the essential part of environmental factors and instrumental.<sup>54</sup>

## a) Environment

Environmental conditions can affect the learning process and results. Environmental factors may include the physical environment and the social environment. Physically can be felt, for instance, the natural environment of temperature, humidity, air stuffiness, and others. Learning in the cold and windy course learning outcomes cannot be maximized.

While the social environment can be divided into the social environment of family and social environment. The family environment includes how parents educate, household atmosphere, prevailing economic conditions, relationships between family members, and cultural background.

 $<sup>^{54}</sup>$ Rusman,  $Pembelajaran\ Tematik\ Terpadu\ Teori\ Praktik\ dan\ Penilaian$  (Jakarta: Rajawali Pers, 2015), p. 68.

Communities include a racket done by the community, for instance, chatted too hard in front of him.

#### b) Instrumental

This instrumental factor about the existence or use is designed by the expected learning outcomes. These factors are expected to run by the learning objectives that have been planned. Can intangible factors (hardware) that school infrastructure. While the factors (Software) such as the use of the curriculum, lab, learning programs and so on.

## 2) Internal Factors

External factors are factors that come from within the individual contained in the important parts of physiological factors and psychological factors.<sup>55</sup>

# 1) Physiological factors

These physiological factors generally about health conditions that are on students, not in a state of fatigue, physical disability or so.

# 2) Psychological factors

Psychological factors in each individual have the same condition. Surely, it can be influenced by several psychological factors, among others IQ, attention, interest, aptitude, motivation, readiness or maturity, reasoning power of students.

# c. Learning Outcome Indicators

Indicators of learning outcomes in essence that the disclosure of learning outcomes covering three areas namely cognitive, affective, psychomotor. The indicator is the achievement of defined competencies

 $<sup>^{55}</sup>$  Abu Ahmadi dan Joko Try Prastyo,  $\it Strategi~Belajar~Mengajar$  (Bandung: Pustaka Setia, 1997), p. 15.

to obtain information on the progress and mastery of each core competencies of each student.

This is commensurate with the theory of the so-called Benjamin Bloom's Taxonomy of Education Objectives that learning objectives can be classified into three areas namely cognitive, affective, and psychomotor. <sup>56</sup>

- 1) The realm of the cognitive sphere concerning the ability of students in the field of knowledge, intellectual skills of thinking.
- 2) Affective regard to the attitude, the ability to process emotions, feelings, and values.
- 3) Psychomotor sphere concerning the movement or speech skills both verbal and non-verbal.

Learning outcomes expected to be strongly related to the type and characteristics of the materials and subjects presented. To determine indicators of learning outcomes should know the basic competencies and learning objectives of each subject.

# B. Framework of Thinking

Here is an overview of the framework in the research and development unit of media popscra book:

Table 2.3 Mindset

<sup>56</sup> Rusman, *Pembelajaran Tematik Terpadu Teori Praktik dan Penilaian* (Jakarta: Rajawali Pers, 2015), p. 68.

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#### Problem:

The learning media available in schools is still dominated by science lessons and social studies lessons, while the mathematics learning media, especially the material for measuring units of length and weight, did not exist. Besides, the average student concentration only occurred 10-15 minutes at the beginning of the lesson. Meanwhile, in the learning process, the teacher only uses school textbooks. The lack of media supplies in the learning process was also driven by the Covid-19 pandemic, which required students to study at home which only relied on textbooks. So that in the learning process students feel increasingly bored and lazy to learn because of the absence of interesting media.



Popscra media mnemonic-based unit ladder book.

#### Assumption:

There is an increase in student learning outcomes using popscra book media based on mnemonics in the unit length and weight unit material. relationships between units.

Based on the framework above, it is explained that the problems in the field, namely the learning media available in schools are still dominated by science and social studies lessons. while the mathematics learning media, especially the material for measuring units of length and weight, were absent. In addition, the average student concentration only occurred 10-15 minutes at the beginning of the lesson. Meanwhile, in the learning process, the teacher only uses school textbooks. The lack of media supplies in the learning process was also driven by the Covid-19 pandemic which required students to study at home which only relied on textbooks.

So that in the learning process students feel increasingly bored and lazy to learn because of the absence of interesting media.

Therefore, the researcher provides a solution to this problem by developing a unit ladder book popscra media based on the mnemonic strategy. Researchers assume that by using popscra book media based on mnemonics in this inter-unit relationship material student learning outcomes can be improved.



#### **CHAPTER III**

#### RESEARCH METHODS

# A. Types of Research

This type of research used in this study the methods of research and development or known as the Research and Development (R & D). Research and development are the research methods used to produce a specific product and test the effectiveness of the product.<sup>57</sup> The method-oriented products in the field of education, as a means used by teachers in delivering course material.

According to Nana, R & D is a process or steps to develop a product that already exists, and can be responsible.<sup>58</sup> The results of products have been developed to be tested the effectiveness of the product to find out how effective the product is for learning.

This research through observation and interviews in advance. Significantly researchers figure out how to reduce the problem. This means that in this study the researchers developed a learning medium popscra book for material measurements (correlation length unit and unit mass) fourth-grade elementary school students.

Research and development produce a product that is a media-shaped object (hardware). The resulting product is a product that is rectangular in shape, made of thick cardboard, contains three parts layout, for students of SD/MI in mathematics. It is expected that these products can assist teachers in delivering course material and help students understand the concept of matter and how to apply them.

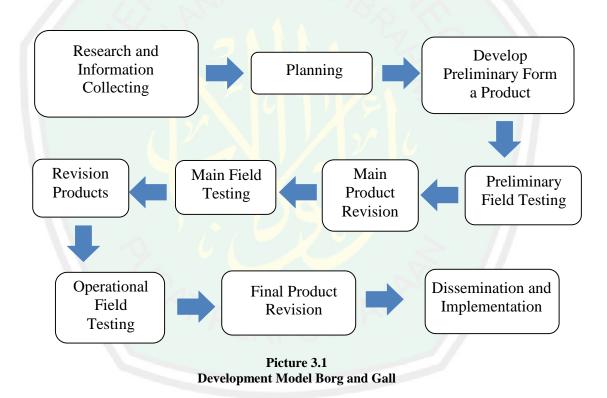
 $<sup>^{57}</sup>$ Sugiyono, Metode Penelitian Kuantitatif Kualitatif dan R & D (Bandung: Alfabeta, 2010), p. 297.

<sup>&</sup>lt;sup>58</sup> Nana Syaodih Sukmadinata, *Metode Penelitian Pendidikan* (Bandung: Bandung: PT Remaja Rosdakarya, 2007), p. 164.

# **B.** Development Model

This study was designed using this type of research and Development, referring to the model of the Borg and Gall. R & D by Borg and Gall is a means used to develop and prove a product of education.<sup>59</sup> This model refers to the main goal to develop products and test the effectiveness of the product to achieve goals. To know the product quality (effectiveness, validity, and practicality).

Based on the research and development of models of Borg and Gall, measures of R & D that is present in ten stages. The scheme of such measures which is as follows:<sup>60</sup>



Borg and Gall detail the steps of the research and development, as below:

<sup>&</sup>lt;sup>59</sup> Punaji Setyosari, *Metode Penelitian dan Pendidikan* (Jakarta: Pernada Media Group, 2010), p. 215.

<sup>&</sup>lt;sup>60</sup> Sugiyono, *Metode Penelitian dan Pengembangan* (Bandung: Alfabeta, 2016), p. 37.

- 1. Conducting research, collecting information including literature reviews, and classroom observation.
- 2. Doing the planning involved in formulating objectives, determining the order of learning, as well as testing the feasibility of a limited scale.
- 3. Perform initial product development which includes preparing materials, learning materials, handbooks, and assessment instruments.
- 4. Field test, the initial product involving one to three schools using 6 to 12 subjects. Using the techniques of interview, observation, and questionnaires, which can then be analyzed to find flaws. Stressing on the process in addition to the learning outcomes.
- 5. Based on the analysis, the researchers conducted a major revision of the product is based on criticisms and suggestions on testing.
- 6. Conduct field tests of the products that are fixed on a wider scale.

  At this stage of qualitative data to assess the process, as well as quantitative data used to determine the pre-test and post-test.
- 7. Revise the products ready to be applied, based on the suggestions and testing.
- 8. Conducting a large-scale trial or more broadly, using the techniques of interview, observation, and questionnaires were analyzed.
- 9. Revision of the final product, based on the advice of the field test.
- 10. Dissemination and reporting product development research results.

However, of the ten steps, the researcher only uses seven steps. This means that researcher used seven steps did not come to the large-scale field trials, researchers limit them to conducting small-scale testing. So that in the sixth step the researcher only uses one school and 1 class which is divided into two groups as the location and research subject. Whereas for steps seven, eight, ten the researchers did not use it.

This is consistent with the suggestion put forward by Borg and Gall (1981: 792) that in thesis and dissertation research it is suggested to limit research to a small scale, including possibly limiting the steps of the research.

The selection of Borg and Gall model development was considered appropriate in the development of instructional media popscra book material relationships between units of measurement. Because of in this model there are some tests so that a number of these tests are considered to be ideal in developing a product. So researcher conducted several tests comprising: First, the test conducted by the expert design and materials experts, in the first test media testers examination to determine the suitability of the design and feasibility of the material. Then, the researcher improves if there are things that are not quite right. The second testing will be done by learning experts, the teachers of mathematics, in line with the previous two experts. Learning experts will provide an assessment in the form of comments and suggestions on the product. The final test will be carried out by the students, which will be drawn a sample of students in a class to use the media as well as filling criticism and suggestions. Some of these tests are expected to answer the problem formulation regarding the attractiveness of learning media that can be used properly.

# C. Development Procedure

The procedure in the research and development of media models a popscra book Borg and Gall. Due to the limited time and expense in conducting the study, researchers used measures Borg and Gall models by adopting the first stage up to stage seven. The research was conducted in SDN Sumberkembar Mojokerto with the target or subject of study in grade IV. Here is an explanation of the seven stages in the development of this research:

#### 1. Research and Information Gathering Early

This first stage researcher doing research and gathering early to identify problems in students SD/MI Class IV, researcher look for information and collect data through observation and interviews with the

teacher concerned. The data is also supported by data obtained through literature studies and literature studies to be relevant grounding in doing development.

# 2. Planning

Based on the identification of problems at SDN Sumberkembar Mojokerto and literature studies on matters concerned. In this second phase of investigators designed a product that will be developed, which is a medium of learning. The first step in this plan that formulates research objectives, estimates funds, manpower, and time. The purpose of planning is to provide the right information and appropriate materials for product development by formulating it as maturely as possible. Thus, compatibility with the objectives to be achieved.

# 3. Development of the Initial Product Format

In the third phase, the researcher designed the development of instructional media in the form of a popscra math book. The format is generated from the development of the media in the form of objects (hardware). After that, prepare and collect the materials and tools that support the creation of the media. The initial design was designed by the researchers themselves, then the product will be validated to some expert validator namely the content, media design experts and learning experts. This is done to assess the feasibility before tested in the field. Therefore, after the validation of the developed media can still be changed, added or subtracted to adjust to the results of field testing and validation of the results of the experts.

## 4. Initial Product Trials

At this stage, the researcher examined the development of products in the field. During this test, researcher asked experts to revise the product, worthy or not to proceed. In addition, the researcher also asked the opinion of the class teacher interviews to provide feedback about the product. After that, the researchers conducted discussions with

subject teachers to produce improvement or refinement of the appropriate product.

#### 5. Revised Product

After conducting early trials, the researcher knows the things that need to be repaired from products that have been developed. Based on questionnaire data that has been done to the limited experimenters among the expert design, subject matter experts, as well as expert learner (teacher learning).

#### 6. Field Trials

The sixth stage is to carry out extensive trials, namely to students in schools that became research by disseminating questionnaires to experts and students and then to evaluate the pre-test and post-test to the students. Questionnaires were given to the experts (design, materials, learning) are made slightly different from the questionnaire given to the students to facilitate students in understanding the questionnaire given.

#### 7. Product Revision

The seventh stage of the step covers all the stages that have been passed by the researcher. At this rate, researcher express product development based on the data that has been obtained from the distribution that has been done in the earlier stages, this step is also a step in the improvement of researchers last.

#### **D. Product Test**

The test of this product is intended to collect data as the base material consideration in determining the validity, effectiveness, and efficiency of media popscra book is used as a medium of learning. In the pilot phase of this product are the activities that conduct ted by the trial design, the subject of the trial, the type of data, data collection instruments, data analysis techniques.

## 1. Trial Design

In the design phase of this trial, the researchers used several stages namely: consultation, individual stage (validation expert), and field-testing stage.

#### a. Consultation Phase

At this stage, the researcher guidance to the supervisor and conduct an examination of media popscra book developed. Based on the results of the consultation, researchers get referrals and product improvement suggestions if there are things that are not in accordance with the product.

#### b. Individual Test Phase

At this stage the researchers conducting the validation test product to the expert (expert design, expert content, learning experts) and practitioners. Experts and practitioners that provide guidance and suggestions through comments and ratings that can be used by researchers to determine the feasibility of the products used in learning.

## c. Stage of Field Trials

At this stage of field trials, researchers conducted a study using the product developed to grade IV SDN Sumberkembar Mojokerto, amounting to 21 students.

# 2. Subjects Trial

Subject trials were included in the research and development of popscra book media this includes:

# a. Matter Expert Math

Subject matter experts are lecturers who are experts in the material master measurement. The qualification of the lecturers is the minimum educational backgrounds master's degree math graduate and master mathematical characteristics. In addition, the material expert is someone who is willing to perform testing of the material so that measurement can determine the suitability of the material to the media

measurement popscra book. Researchers chose matter experts in research and development, Mrs. Ria Norfika Yuliandari, M. Pd.

#### b. Media Design Experts

Media design experts in research and development is an expert in the field of design, minimal has a background on a master's degree and has experience in designing or designing learning media. In addition, media design expert is someone who is willing to perform testing of the product so as to determine the suitability of media popscra book with material measurements. Researchers chose media design experts in research and development that is Mr. Galih Puji Mulyoto, M. Pd.

# c. Learning Expert Trials or Subject Teachers

Trial learning experts in research and development as a Mr. Topo, S. Pd Teacher of mathematics or fourth-grade at SDN Sumberkembar Mojokerto. Selection of learning experts is based on the consideration that the teacher has teaching experience and know the characteristics of the fourth-grade students. And the availability of the teacher as assessor and the product development for the sourcing and development results

#### d. The Test Users (Students)

The test users in research and development consists of the practice class of 20 students. From one class there are two groups, the first is the sumbersuko group as an experimental class totaling 10 students and the second is the twin source group as a control class totaling 10 students. The existence of this user trial aims to determine the effectiveness of the Popscra book media on the unit material of length and weight.

# 3. Types of Data

Types of Data, types of data collected on research and development by the information media measurement popscra book material. Next will be grouped into two:

# a. Qualitative Data

The qualitative data is obtained based on the information through interviews, as well as the validation of a questionnaire containing critics and suggestions for improvements consideration of the experts (material, design, and learning) as well as students.

#### b. Quantitative Data

This quantitative data was obtained based on the scoring form of a percentage of student learning outcomes on scoring (pre-test and post-test) done in class.

#### 4. Data Collection Instrument

The instruments collecting data in this study using the instrument of interviews, questionnaires and tests acquisition of learning outcomes. Here's the explanation:

#### a. Questionnaire

The questionnaire is a data collection tool to spread the researchers used a form that contains questions or statements that must be answered or responded to by the respondent to provide a written response. Through the questionnaire collected data on the accuracy of media components, precision design of learning, learning content accuracy, correct use of learning media. The questionnaire was given to the subject matter experts, expert design, learning experts (subject teachers concerned), as well as students.

Questions are used by researchers in making the questionnaire using closed and open questions. Open questions are used to obtain qualitative data. While closed questions used to obtain quantitative data.

## b. Acquisition Test Learning Outcomes

Tests acquisition of learning outcomes is a test used to measure the results of the fourth-grade students at SDN Sumberkembar Mojokerto. The test is in the form of pre-test and post-test similar to that given to different groups, namely the control class and experimental class. Pre-test and post-test contain entries and descriptions about evaluation. Both contain about the relationship between the unit of length and the relationship between the unit of weight. Their pre-test and post-test were used to see the mastery of learning outcomes which demonstrate the ability of students before and after using the media. Thus, researchers know there is an influence on increasing student learning outcomes.

## 5. Data Analysis Technique

The data in this research and development is a very important process. The data analysis is a process to process and interpret data with functions to have a clear meaning and significance according to the type of data collected. 61 There are two data analysis used by researchers to process the data in the study and development of these products, namely descriptive analysis and t-test. The technique used in accordance with the data obtained from the data collection process as described in the data collection instruments.

## a. Analysis of Learning Content

Learning content analysis done by formulating appropriate learning objectives with core competencies (KI) and Competence Quintessentially (KD) in order to deliver the composition of the material to fit the learning media in the form of products have been developed. The results of the analysis in order to develop guidelines or basic products as a medium of learning.

b. Analysis of the Feasibility and Effectiveness of the Product

<sup>61</sup> Wina Sanjaya, *Penelitian Tindakan Kelas* (Jakarta: Kencana Prenada Media Group, 2009), p. 106.

Data from the questionnaire design experts, subject matter experts, instructional specialists, researchers and students used to test the feasibility and effectiveness of a product will be described on the characteristics of each variable. The researcher used the results to revise the product that has been developed by the researcher. Then, the researchers presented the results of the development of products to be used and applied in learning. A questionnaire had been distributed to several parties, to determine the feasibility of popscra book media relations between units of material, it will be calculated as per the group points and total points. <sup>62</sup>

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

Where:

P = The percentage of the level of validity

 $\Sigma x$  = Answer Rating Selected

 $\Sigma xi$  = Scores Answer Rating

Table 3.1

Questionnaire Rating Scale for Experts

Skor	Keterangan
5	Very precise, very appropriate, very clear, very interesting, very easy
4	Precise, appropriate, clear, attractive, easy
3	Precise enough, appropriate enough, clear enough, interesting enough, easy enough
2	Less precise, less appropriate, less clear, less attractive, less easy
1	Very imprecise, very inappropriate, very obscure, very unattractive

The assessment rules for answers addressed to students using the media are as follows:

Table 3.2

Questionnaire Rating Scale for Students

 $<sup>^{62}</sup>$  Nana Sudjana, Teaching and Learning Outcomes Assessment (Bandung: Rosdakarya, 1990), p. 118.

Skor	Keterangan	
4	Very precise, very appropriate, very clear, very interesting, very easy	
3	Precise, appropriate, clear, attractive, easy	
2	Less precise, less appropriate, less clear, less attractive, less easy	
1	Very imprecise, very inappropriate, very obscure, very unattractive	

The questionnaire result data was then analyzed using the following criteria guidelines:<sup>63</sup>

Table 3.3
Product Qualification Criteria

Precentage (%)	Product Qualification Criteria
90-100	Very good, no need for revision
75-89	Well, there's no need for revision
65-74	Good enough, needs revision
55-64	Not good, needs to be revised
<55	Very not good, all need revision

# c. Analysis of learning outcomes tests

Researchers used tests for the control class and experimental class. Field trial data were obtained using pre-test and post-test. The results of the known trials were compared. This is done to determine the differences in learning outcomes between the two. To determine the significance of the differences between the control and experimental classes, it is necessary to test statistically with a correlated t-test. The formula used to calculate the t-test.<sup>64</sup>

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \cdot \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

<sup>&</sup>lt;sup>63</sup> Suharismi arikunto, Prosedur Penelitian: Suatu Pendekatan Praktek (Jakarta: Rineka Cipta, 2001), p. 245.

<sup>&</sup>lt;sup>64</sup> Sugiyono, Metode Penilitian Pendidikan (Bandung: Alfabeta, 2015), p. 422.

#### Information:

t = t-test

 $x_1$  = average value of the experimental class

 $x_2$  = average value of the control class

 $s_1$  = variance of the experimental class sample

 $s_2$  = variance of the control class sample

 $n_1$  = number of experimental class respondents

 $n_2$  = number of control class respondents

From the results of the t-test, then compared with the T-table with a significance level of 0.05 or 5%. And make the following hypothesis:

H<sub>0</sub>: There is no significant difference between classes using Popscra book media and classes that do not use Popscra book media.

H<sub>1</sub>: There is a significant difference between the class using Popscra book media and the class that does not use Popscra book media.

Decision-making:

If  $T_{count}$ >  $T_{table}$ , then the results are significant, meaning that  $H_1$  is accepted.

If  $t_{count}$  <  $t_{table}$ , then the result is not significant, meaning that  $H_1$  is rejected.

# CHAPTER IV DEVELOPMENT RESULTS

# A. The Process of Developing Popscra Book Learning Media

This research and development resulted in a teaching material product in the form of a mnemonic based Popscra-Book on the unit length and weight for class IV. In the process of developing this popscra-book media using the Borg and Gall model. Based on the steps that have been adapted in the model, the researcher presents the following data results:

## 1. Preparation and Data Collection Stage

The preparation and data collection stages were in the form of curriculum identification at SDN Sumberkembar Mojokerto. Based on this identification, the researcher obtained data in the form of core competencies, basic competencies, indicators, and learning objectives. The following are the detailed identification results from the field.

#### a. Core Competencies

- 1) Accepting, implementing, and respecting the teachings of the religion they adhere to.
- 2) Have honest, disciplined, responsible, polite, caring, and confident behavior in interacting with family, friends, teachers and neighbors.
- 3) Understand factual knowledge by observing (hearing, seeing, reading) and asking questions based on curiosity about himself, God's creatures and their activities, and the objects they find at home, school, and play area.
- 4) Presenting factual knowledge in a clear, systematic, and logical language in aesthetic works, in movements that reflect healthy children, and in actions that reflect the behavior of children who are faithful and have noble character.

# b. Basic Mathematics Competence

- 1) Explain and round off the measurement results for length and weight to the nearest unit.
- 2) Solve the problem of rounding the measurement results of length and weight to the nearest unit.
- c. Mathematics Learning Indicators
  - 1) Determine the rounding of the measurement results for length and weight to the nearest tens
- 2) Determines the rounding of the measurement results for length and weight to the nearest hundreds
- 3) Solve the problem of rounding the measurement results of length and weight to the nearest unit
- 4) Solves the problem of rounding the measurement results for length and weight to the nearest tens
- 5) Solves the problem of rounding the measurement result for length and weight to the nearest hundreds
- d. Mathematics Learning Materials

Mathematics learning materials for units of length and weight, which are discussed in the Approximation chapter in grade 4.

# 2. Popscra Book Media Development Stage

Popscra book learning media was developed through several stages. First, the preparation of the media uses the Corel Draw 2019 software, from the preparation of the media it produces the popscra book media design. Then the researcher carried out the next stage, namely the validity stage, which was carried out by design experts, content experts, and learning experts.

- a. Popscra Book Media Compilation
  - 1) Specifying the Title

The title specified in the learning media is Popscra Book Media based on mnemonic units of length unit weight. The word popscra book stands for pop scraft book. the two words are combined to make spelling easier.

## 2) Writing Content

The learning media developed contains a cover, a foreword, instructions for use, a description of the material for units of length and weight consisting of the definition of units of length and weight, the relationship between units, conversion tables for units of length and weight, pictures of measuring instruments for units of length and weight. Next is the evaluation of the material from the unit of length and weight, as well as about the author. The software used in writing the material is Microsoft Word 2016 software, which is then combined with pictures or other media designs in the Corel Draw 2019 software.

## 3) Specifying Paper

Learning media size: 19 cm x 16 cm. Various types of paper are used:

- a) Thick cardboard is used for each sheet of popscra book media.
- b) Sticker paper is used for each sub-chapter of the material.
- c) Art paper is used to write down each material and pictures.
- d) buffalo paper to coat the cardboard used as the background of each page.
- e) Linen paper to make a variety of pop scraft book shapes from every page.

#### 4) Determining the Layout and Background

The use of layout in this media aims to make the media attractive so that students can use it well. The following are the steps taken by the researcher in determining the layout and background.

#### a) Letter Selection

The use of fonts in this media is designed in various forms, namely the Geo Slab703 Md BT font is used for the title, the Quotable font is used for writing length and weight units on the cover, the Headster font is used for writing each sub-chapter name of the

material, while the Comic Sans font MS is used to write instructions for use, material, evaluation, about the author, and back cover. In addition to the typeface, the color selection of the letters is also adjusted to the background so that the letters can be read clearly.

# b) Image Selection

The selection of images on popscra media is adjusted to the theme. Through the process of gathering media design supporting components, such as animated images that support the material. Then the image is edited using Corel Draw 2019. The formats used are jpg and png.

## c) Color and Background Selection

Using colors tailored to the theme or sub-chapter of each page, the researcher chose a green-blue color theme. The goal is to give a fresh and attractive impression on every page. So that there is continuity between the background, image layout and sub material. The color selection is more varied and uses bright colors. In addition to basic colors, researchers also use color combinations to make popscra media look more attractive. Meanwhile, background selection is following the theme. The researcher chose the theme of polka dots, zebra stripes, plain and irregular. So that the pop scraft book shape adapts to the background theme.

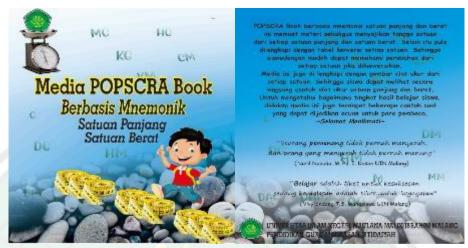
## b. Popscra-Book Media Design Results

The next stage, after planning, is making learning media products in the form of popscra books based on mnemonics. The following are the results of the development of learning media that have been carried out:

#### 1) Front Cover and Back Cover

Results of the front cover design in this media development use illustrations of pictures related to the media title. Its contents consist of the name of the book, namely Media Popscra Book based on mnemonics, with the title Units of Length and Weight. While the back cover contains a description of the contents of the book. Besides, motivational words

from the author and supervisor for readers. As well as the name of the place where the author took his undergraduate education.



**Picture 4.1 Front and Back Cover** 

## 2) Foreword

Foreword contains the opening of communication between the book and the reader. The author's purpose for making the book, as well as the compiler's hopes for the reader.



Picture 4.2 Foreword

#### 3) Instructions for Using Books

The manual for use contains directions for the reader when using this book. The goal is to make it easier for readers.













Picture 4.3 Design Instructions for Use

# 4) Content of the Material

The content of the material consists of 5 sub-chapters in the sequence below, consisting of:

a) Definition of units of length and weight



Picture 4.4 Definition of units of length and

b) The correlation between units of weight



Picture 4.5 Correlation between units of

c) Lenght and weight unit reminder



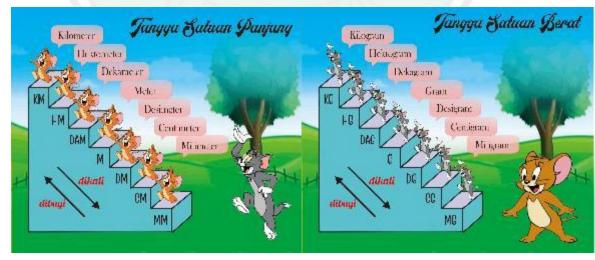
Picture 4.6 Length and Weight Unit Reminder

Researchers combine from sub-chapters of material understanding units of length and weight to reminders of units of length and weight on one page. The following:



Picture 4.7 The material is used as a scraft book

d) Ladder unit length and weight



Picture 4.8 Ladder unit length and weight

# e) Length unit conversion table

Panjang	RM	EW.	DPM	М	DM	EM	MM
NA	1	10	100	1000	10.000	100,000	1.000.00
нм	0.1	1	10	100	1000	10,000	100.00
DAM	0.01	0.1	1	10	100	1000	10.00
M	0.001	0.01	0.1	1	10	100	1000
DM	0.0001	0.001	0.01	0.1	1	10	100
em	0,00001	0.0001	0.001	0.01	0.1	1	10
MM	0.000001	0.00001	0.0001	0.001	0.01	0.1	1



**Picture 4.9 Length Unit Conversion Table** 



**Picture 4.10 Weight Unit Conversion Table** 

g) Image of measuring unit length



Picture 4.11 Image of Measuring Unit Lenght

# h) Image of measuring unit weight



Picture 4.12 Image of Measuring unit weight

# 5) Evaluation

Contains practice questions in the form of stuffing and story questions. The purpose of the evaluation is to determine the level of students' understanding of units of length and weight









Picture 4.13 Evaluation Unit of Length





Picture 4.14 Evaluation Unit of Weight

# 6) Author biography



**Picture 4.15 Author Biography** 

#### c. Media Validation

After the preparation of the popscra book media is complete, the next step is to test the validity of the media on three validators. The validator consists of media design experts, media content experts, and learning experts or practitioners. The purpose of the validity test is to determine the feasibility level of the media.

The data from the media validation are in the form of quantitative data and qualitative data. The quantitative data were obtained through the results of an assessment questionnaire, while the qualitative data were obtained from the assessment in the form of suggestions from experts. The following is an explanation of the data from the validation results of the Popscra Book media:

## 1) Content Expert Validation Results

Evaluation of the content validation test of popscra book media was carried out by FITK lecturer at UIN Maulana Malik Ibrahim Malang, Mrs. Ria Norfika Yuliandari, M. Pd. The results of the validation by media content experts were quantitative and qualitative data. The following is the data exposure:

#### a) Quantitative Data

Quantitative data from content experts contains questionnaire assessment scores. The following is presented in the table of content validation results.

Table 4.1
Content Expert Validation Results

No	Criteria	Score	Maximum Score	Percentage	Predicate
1	Suitability of topics in the development of learning media	4	5	80%	Well
2	The conciseness of the presentation of the material	4	5	80%	Well
3	Conformance with Competency Standards and Basic Competencies	4	5	80%	Well
4	Conformity with indicators and learning objectives	4	5	80%	Well
5	Suitability of material content with images	4	5	80%	Well
6	Supporting learning materials	4	5	80%	Well
7	Clear descriptions of instructions for use	4	5	80%	Well
8	The size of the letters used is in accordance with the fourth-grade students	4	5	80%	Well

9	The suitability of the media in facilitating students' understanding of the units of length and weight	4	5	80%	Well
10	Conformity with student cognitive	4	5	80%	Well
11	The accuracy of using illustrations	4	5	80%	Well
12	The suitability of the evaluation questions with the material	4	5	80%	Well
13	Language (spelling, punctuation, vocabulary, sentences, and paragraphs) conforms to the rules and terms used in the book	4	5	80%	Well
14	Clarity of material or completeness of material content	4	5	80%	Well
	Total	56	70	80%	Good, no revision

Based on the results of the content expert's assessment of the mnemonic-based popscra book media as table 4.1, the percentage of achievement levels can be calculated as follows:

The calculated percentage obtained is 80%. This figure is converted to the product eligibility criteria conversion table, the percentage of the achievement level of 80% is in good qualification. So there is no need for revision.

# b) Qualitative Data

P = 80 %

Qualitative data from content experts in the form of suggestions and constructive criticism for researchers. The following is presented in tabular form:

Table 4.2 Content Expert's Criticism and Suggestions

Subject	Criticism and Suggestions
Ria Norfika Yuliandari, M. Pd	<ol> <li>The use of sentences and pronouns should be simpler and more striking to the reader. Ananda became a student.</li> <li>In the evaluation questions, include character values, light and real positive content, which exist in everyday life, as well as those that hone students' logic.</li> </ol>

Comments and suggestions given by content experts in open questions are taken into consideration by researchers to improve the product.

c) Product Revisions

Table 4.3
Content Expert Product Revision

No	Revision Points	Before Revision	After Revision		
1	The use of sentences and pronouns should be simpler and more striking to the reader. Ananda became a student	Contain the property of the control	Untrol menginget unstan SATUAN PANTANG dinyo modeh, kemu bida menggenden kalincit Kuchig himn daten mobil desi centil mender-modeli. Kuchig himn daten mobil desi centil mender-modeli. Kuchig (hr.) Hidroneter H		
2	In the evaluation questions, include character values, light and real positive content that exist in everyday life, as well as those that hone students' logic.	Ago Berlotth Mengerjokan  1. The selections we may all complete for the co	Comparison of Japanese 1999  Comparison of Ja		

# 2) Design Expert Validation Results

The evaluation of the design validation test from popscra book media was carried out by the Lecturer of FITK UIN Maulana Malik Ibrahim Malang, Mr. Galih Puji Mulyoto, M. Pd. The results of the media design expert validation were quantitative and qualitative data. The following is the data exposure:

# a) Quantitative Data

Quantitative data from design experts contains questionnaire assessment scores. The following is presented in the table of design validation results.

Table 4.4

Design Expert Validation Results

No.	Criteria	Score	Maximum Score	Percentage	Predicate
1	Cover design according to the content of the material	4	5	80%	Well
2	The cover type used corresponds to grade 4 students	4	5	80%	Well
3	The cover letter size used corresponds to grade 4 students	5	5	100%	Very good
4	Do not use too many font combinations	5	5	100%	Very good
5	Placement of the consistency layout elements based on the spatial layout of the title and sub-chapter and the typing of the material	4	5	80%	Well
6	Clarity of typing writing	4	5	80%	Well
7	The use of pictures is clear and in accordance with the characteristics of grade 4 students	4	5	80%	Well
8	Image placement accuracy	4	5	80%	Well
9	Image size accuracy	4	5	80%	Well
10	The combination of images and text	4	5	80%	Well
11	Color selection, font, and background	4	5	80%	Well

	Total		75	85%	Good, no revision
15	The overall appearance of the product is attractive	5	5	100%	Very good
14	The layout is appropriate	4	5	80%	Well
13	Consistency in the use of spacing, title and typing of material	4	5	80%	Well
12	Table quality in products	5	5	100%	Very good

Based on the results of the design expert's assessment of the mnemonic-based popscra book media as table 4.4, the percentage of achievement levels can be calculated as follows:

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

$$P = \frac{4+4+5+5+4+4+4+4+4+4+4}{5 \times 14} \times 100\%$$

$$P = \frac{64}{75} \times 100\%$$

P = 85.3%

The calculated percentage obtained is 85.3%. This figure is converted to the product eligibility criteria conversion table, the percentage of the achievement level of 85.3% is in good qualification. So there is no need for revision.

# b) Qualitative Data

Qualitative data from design experts in the form of suggestions and constructive criticism for researchers. The following is presented in tabular form:

Table 4.5
Design Expert's Criticism and Suggestions

Subject	Criticism and suggestions
Galih Puji Mulyoto, M. Pd.	<ol> <li>There should be instructions for using the media.</li> <li>Answer keys and hot questions in writing size 16</li> </ol>

Comments and suggestions given by design experts in open questions are taken into consideration by researchers to improve the product.

# c) Product Revisions

Table 4.6
Design Expert Product Revision

No	Revision Points	Before Revision	After Revision
1	There should be instructions for using the media	A second control in a seco	De Bandand van der der gegen der der der gegen der der gegen der der gegen d
2	Hot questions on writing size 16	Ago, kerlanis Mengerjakani  Conjection of control of the property of the prope	Lang-point aprecipation of the company from the control of the company from the company fro

# 3) Learning expert validation results

The assessment of the learning validation test from the popscra book media was carried out by the fourth-grade teacher at SDN Sumberkembar Mojokerto, Mr. Topo, S. Pd. The results of the media learning expert validation were quantitative and qualitative data. The following is the data exposure:

# a) Quantitative Data

Quantitative data from learning experts contains questionnaire assessment scores. The following is presented in the table of learning validation results.

Table 4.7
Learning Expert Validation Results

No	Criteria	Score	Maximum Score	Percentage	Predicate		
1	Suitability of topic formulations in product development	4	5	80%	Well		
2	Make it easy for teachers to learn	4	5	80%	Well		
3	Helping teachers in delivering material	5	5	100%	Very good		
4	Suitability of material content with KI and KD	4	5	100%	Very good		
5	Systematic suitability of learning content descriptions	4	5	80%	Well		
6	The suitability of the size and type of letters used in learning media	4	5	80%	Well		
7	The suitability of the image or illustration with the material	5	5	100%	Very good		
8	The language used is communicative	5	5	80%	Well		
9	The accuracy of the material presented can provide motivation to learn to students	4	5	100%	Very good		
10	The accuracy of the evaluation used can measure students' abilities	4	5	80%	Well		
	Total	43	50	86%	Good, no revision		

Based on the results of the learning expert's assessment of the mnemonic-based popscra book media as table 4.1, the percentage of achievement levels can be calculated as follows:

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

$$P = \frac{4+4+5+4+4+4+5+5+4+4}{5 \times 100} \times 100\%$$

$$P = \frac{43}{50} \times 100\%$$

$$P = 86\%$$

The calculated percentage obtained is 86%. This figure is converted to the product eligibility criteria conversion table, the percentage of achievement level of 86% is in good qualification. So there is no need for revision.

#### b) Qualitative Data

Qualitative data from learning experts in the form of suggestions and constructive criticism for researchers. The following is presented in tabular form:

Table 4.8 Learning Expert's Criticism and Suggestions

Subject	Criticism and suggestions
Topo, S. Pd	1. Good learning media, helping teachers in learning. My suggestion is if you use Popscra book media for a large number of students, so that it is doubled or the size of the book, pictures and writing be enlarged

Comments and suggestions given by learning experts in open questions are taken into consideration by researchers to improve the product.

# c) Product Revisions

Based on suggestions and criticisms from learning experts, researchers analyzed and did not make revisions to popscra-Book media.

# B. Results of the Popscra-Book Learning Media Interesting

The level of attractiveness in the popscra book learning media based on the mnemonic unit of length unit weight was determined by filling out a questionnaire conducted by grade IV SDN Sumberkembar. Sumbersuko Group or the experimental class. The following is the assessment of the fourth-grade students of the Sumbersuko group of the product material for units of length and weight:

Table 4.9
Results of Student Questionnaire Assessment of Popscra Book Media

No.	Criteria	Score (X <sub>1</sub> , X <sub>2</sub> , X <sub>3</sub> , - X <sub>10</sub> )	Maximum Score	Percentage	Predicate
1	Students feel happy when learning mathematics using Popscra Book learning media	4,4,3,4,3,4,4,3,3,3	40	87.5%	Well
2	By using popscra book learning media, it can increase the enthusiasm of students in learning	3,3,4,4,4,3,4,4,4,3	40	90%	Well
3	Popscra book learning media makes it easier for students to understand the subject matter	3,4,3,4,3,3,4,3,3,3	40	82.5%	Well
4	Popscra book learning media is in accordance with the material for units of length and unit of weight	4,4,4,3,3,3,3,3,3,4	40	85%	Well
5	The language used in the Popscra Book learning media can easily be understood by students	4,4,3,4,4,3,4,3,4	40	92.5%	Very good
6	The images and contents of the Popscra book learning media make it easier for students to remember the material	3,3,3,3,4,4,3,4,4,3	40	85%	Well
7	Students feel interested in learning material units of length and weight using popscra book media	4,3,3,3,4,4,3,4,4,3	40	87.5%	Well
	Total	244	280	87%	Good, no revision

Based on the quantitative data obtained in media assessment through filling out a questionnaire, the next step is to analyze the data that has been presented. Data analysis is calculated using the percentage formula as follows:

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

$$P = \frac{209}{240} \times 100\%$$

$$P = 87\%$$

Based on the above calculations, it can be seen that of the 7 criteria, the number is 209 with an average percentage of 87%. Thus, the results of these data indicate that the popscra book media developed is in good criteria and does not need to be revised.

# C. Differences in Learning Outcomes for Students Learn Using Popscra Book Media and Students Do not Use Media

Field trial data obtained from the pre-test and post-test assessments of the fourth-grade students of SDN Sumberkembar Mojokerto, totaling 20 students. Determination of research and development subjects using sampling techniques with random sample sampling, namely taking samples from a random population without paying attention to the strata in the population. There are two classes, namely the experimental class using popscra book media, totaling 10 students. And the control class that does not use media is 10 students. Based on the data obtained, the pre-test means score for the experimental class was 54.5 and the post-test mean score for the experimental class was 85.5. While the pre-test average value for the control class is 54.5 and the post-test average value for the control class is 77. The following is the explanation of the field trial results:

Table 4.10 Results of the Experiment Class Pre-test and Post-test

No.	Full name	Pre test	Post test
1	Cika Firdiana Putri	45	80
2	Deva Putra Hermawansyah	45	75
3	Fajar Aditya Putra	70	95
4	Fania Khoirotul Ummah	50	85
5	Hanum Puspita Sari	50	85
6	Irfan Saputra	40	75
7	Muhamad Rifki Afandi	50	85
8	Muhamad Thoriq Sholikhul Ulah	60	90
9	Muhammad Bahrudin Nicolas Saputra	65	90
10	Salsabilla Putri Ramadhani	70	95
total		545	855
Average value		54.5	85.5

Table 4.11 Results of Pre-test and Post Test Control Class

No.	Full name	Pretest	Posttest
1 /	Ammar Zafran Hartana	70	85
2	Cantika Engelaulia Shavira	60	80
3	Fanesa Dwi Rahmadani	40	70
4	Ferdiansyah Dwi Saputra	70	90
5	Muhammad Azzam Aufa Arizky	40	70
6	Muhammad Bagus Dwi Setiawan	45	70
7	Nova Three Yuda Putra	65	80
8	Salsabila Amelia Putri	55	80
9	Valensya Dwi Putri Wijaya	45	70
10	Vincent Marvelino Putra Febrian	55	75
total		545	770
1	Average value	54.5	77

Based on the table above, it can be seen that the pre-test average value of the control class and the experimental class is the same as 54.5. This proves that the control class and experimental class test have the same or homogeneous abilities. Researchers analyzed the data from the field trials using two analyzes, namely by using manual formulas and using the SPSS application.

# 1. Data Analysis Using Formulas Manually

This analysis uses the following formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \cdot \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Information:

t = t-test

 $x_1$  = the average value of the experimental class

 $x_2$  = the average value of the control class

 $s_1$  = the variance of the experimental class sample

 $s_2$  = control class sample variance

 $n_1$  = the number of respondents in the experimental class

 $n_2$  = number of control class respondents

Then the t test is carried out with the following calculations

$$t = \frac{85,5 - 72,5}{\sqrt{\frac{(10 - 1)7.245688373^2 + (10 - 1)7.168604389^2}{10 + 10 - 2}} \cdot \left(\frac{1}{10} + \frac{1}{10}\right)}$$

$$t = \frac{13}{\sqrt{\frac{(9).7,245688373^2 + (9).7.168604389^2}{18}} \cdot \left(\frac{2}{10}\right)}$$

$$t = \frac{13}{\sqrt{\frac{(9).52,499999999 + (9).51,388888886}{18}} \cdot \left(\frac{2}{10}\right)}$$

$$t = \frac{13}{\sqrt{\frac{472,499999999 + 462,49999997}{18}} \cdot (0,2)}$$

$$t = \frac{13}{\sqrt{\frac{934,99999996}{18} \cdot (0,2)}}$$

$$t = \frac{8,5}{\sqrt{51,944444442.0,2}}$$

$$t = \frac{13}{\sqrt{10,3888888888}}$$

$$t = \frac{13}{3,2231799342}$$

t = 4,0332839821

$$t = 4,033$$

a. A significance level of 0.05

b. dk =
$$n_1 + n_2 - 2$$
  
= 10 + 10 - 2 = 18

So that we get  $t_{table} = 2,100$ 

From the calculation of the  $t_{count}$  above, the results will be compared with the  $t_{table}$  using a significance level of 0.05 or 5%. The decision making is determined by the following conditions:

 $H_0$  = there is no significant difference between learning outcomes in the experimental class and the control class.

 $H_1$  = there is a significant difference between learning outcomes in the experimental class and the control class.

Test criteria, if:

a.  $T_{count}$ >  $t_{table}$ , then  $H_0$  is rejected.  $H_1$  is accepted, meaning that there is a significant difference in the mean between the two variables investigated.

b. T<sub>count</sub> < t<sub>table</sub> then H<sub>0</sub> is accepted. H<sub>1</sub> is rejected, meaning that there is no significant difference in the mean between the two variables investigated.

From the above calculations, it shows that the t<sub>count</sub> is 4.033 and the  $t_{table}$  is 2,100. The meaning is  $t_{count}$  is greater than  $t_{table} = 4.033 > 2,100$ . Then  $H_0$  is rejected  $H_1$  is accepted.

Based on the results of the calculations and comparisons above, it can be seen that there is a significant difference between students who use Popscra book media and students who don't use Popscra book media.

## 2. Data Analysis Using SPSS Statistics Application 23

The t-test analysis was carried out to examine the difference in the mean post-test scores in the experimental class and the control class. The ttest in this study used the IBM SPSS Statistic 23 application using the t-test on the independent sample t-test. This was done because the data being tested consisted of two unrelated classes. Namely comparing the experimental class and the control class.

Table 4.12 Results of the Independent Sample T-Test Analysis

**Independent Samples Test** Levene's Test for Equality of Variances t-test for Equality of Means 95% Confidence Std. Interval of the Mean Error Sig. Difference (2-Differenc Differen F Sig. Df tailed) Lower Upper e ce Learning Equal .055 .817 4,033 18 13.00000 3.22318 6.22835 19.77165 outcomes variances .001 Mathematics assumed Equal 4,033 17,998 .001 13.00000 3.22318 6.22829 19.77171 variances not assumed

From the table above it is known that the p-value (sig) of *levene's test for equality of variances* is 0,817, or greater than the value 0.05. In the homogeneity test rule when sig: p>0.05, it can be said that the variance of the two classes is the same. Besides, it is also known that sig. (2-tailed) on the equal variances assumed line is 0,001. The decision making is determined by the following conditions:

# Hypothesis:

- $H_0$  = there is no significant difference between learning outcomes in the experimental class and the control class.
- $H_1$  = there is a significant difference between learning outcomes in the experimental class and the control class.

# Testing criteria:

- a.  $H_1$  is accepted if the value is sig. (2-tailed) <0.05
- b.  $H_0$  is accepted if the value is sig. (2-tailed)> 0.05

According to the table above, the value is known sig. (2-tailed) of 0.001, it can be concluded that  $H_0$  is rejected and  $H_1$  is accepted. This means that there is a significant difference in the learning outcomes of students who use the popscra book media and those who don't use the popscra book media.

#### **CHAPTER V**

#### **DISCUSSION**

## A. Popscra-Book Learning Media Specifications

The development of mnemonic-based popscra book learning media is based on the fact that there are no learning media at SDN Sumberkembar Mojokerto, which can support learning activities on unit length and weight unit material. Thus, this development and research activity aims to fulfill interesting learning media and can complement existing media. This is in line with the theory about the benefits of learning media, namely through the use of varied, interesting learning media, can overcome passive indifferent attitudes, and encourage students to be enthusiastic in learning. So that by using attractive media students can be motivated to understand the material for units of length and weight. Besides, it can help teachers in delivering material, to achieve learning objectives.

The process of developing popscra book media based on mnemonics goes through seven stages, namely: collecting data, planning, initial product development, initial product testing, product validation by the three experts followed by revisions, wide-scale trials, and final product revisions.

This is in line with the learning media development process proposed by Borg and Gall, including collecting data, planning, conducting initial product development, conducting initial product tests involving several experts. carry out major product revisions, conduct small-scale field trials of products, revise products that are ready to be applied, conduct large-scale trials, revise final products, disseminate and report product development research results.<sup>66</sup>

<sup>&</sup>lt;sup>65</sup> Arief Sadiman, *Media Pembelajaran dan Proses Belajar Mengajar, Pengertian Pengembangan dan Pemanfaatannya* (Jakarta: Raja Grafindo Persada, 2002), p. 16.

 $<sup>^{66}</sup>$ Sugiyono, Metode Penelitian dan Pengembangan (Bandung: Alfabeta, 2016), hlm. 37.

However, of the ten steps described in the development of Borg and Gall, researchers only used seven steps. This is consistent with the suggestion put forward by Borg and Gall (1981: 792) that in thesis and dissertation research it is suggested to limit research to a small scale, including that it is possible to limit the steps of the research.

The popscra book learning media developed by researchers contains important components, namely the front page, preface, instructions for use, content or material, evaluation questions, author's bio, and the back page of the book. Popscra book media is in the form of physical print, in its manufacture the media uses five types of paper. The use of these various types of paper is the basic material for making media so that the media looks attractive, neat, practical and easy to use as well as its nature. This is reinforced by the theory about the requirements for selecting good instructional media, namely the media should have practical value and last. <sup>67</sup> The following is a description of the mnemonic-based popscra book media development product specifications:

Table 5.1
Popscra Book Mnemonic Based Learning Media Specifications

Physical form	Print		
Book title	Popscra book media based on mnemonic units of length unit weight		
Target	Grade IV student of SDN Sumberkembar Mojokerto		
Page thickness	7 pages		
Print	First		
Font size	12, 16, 25		
Font type	Geo Slab703 Md BT, Quotable, Comic Sans MS,		
	Headster		
Page paper size	19 cm x 16 cm		
Space	1.5		
Media section components	Front page, foreword, instructions for use,		
	material content (meaning, mnemonic reminders		
	in units of length and weight, examples in daily		
	life, relationships between units, pictures of unit		
	ladders, unit conversion tables, pictures of		
	measuring instruments for each unit), questions		
	evaluation, about the author, back page		
TD1 1. C.1			

The results of the mnemonic-based popscra book media validation in this development process consist of content or material analysis, design

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<sup>&</sup>lt;sup>67</sup>Azhar Arsyad, *Media Pengajaran* (Jakarta: Raja Grafndo Persada, 1997), p. 73-74.

analysis, and analysis of the validity of use in the learning process developed based on the following percentage levels of achievement:

# 1. Analysis of Content or Material Expert Validation Results

The evaluation of the content validation test of the popscra book media was carried out by a lecturer at FITK UIN Maulana Malik Ibrahim Malang who is competent in the field of Mathematics, namely Mrs. Ria Norfika Yuliandari, M. Pd. The results of the validation test given by the media content expert showed a percentage of 80%. This shows that Popscra book media is good and suitable for use. The following results of the content expert validation or popscra book media material will be described in detail as follows:

- a. The suitability of topics in the development of learning media obtained a percentage value of 80%. This shows that the topics in the development of popscra book media are in accordance with the characteristics and ages of grade IV SD/MI.
- b. The wrinkling of the presentation of subject matter obtained a percentage of 80% This shows that the presentation of the material is coherent so that students do not experience confusion in the learning process.
- c. Conformity with competency standards and basic competence scores 80%. This shows that the material topics on the development of popscra book media are in accordance with the 2013 curriculum.
- d. Conformity with indicators and learning objectives obtained a value of 80%. This shows that the material topics in the development of popscra book media are in accordance with the 2013 curriculum.
- e. The suitability of the content of the material with the image obtained a percentage value of 80%. This shows that the topic and use of images on the material are in accordance with the characteristics of grade IV SD / MI students.
- f. Supporting learning materials obtained a percentage value of 80%. This shows that the use of motivational words can increase students' enthusiasm for learning.

- g. A clear description of the instructions for use obtained a percentage value of 80%. This shows that the use of Popscra book media is very practical and easy.
- h. The size of the letters in the learning media obtained a percentage value of 80%. This shows that the use of letter sizes is in accordance with the characteristics of grade IV students.
- i. The suitability of the media in facilitating students' understanding of the units of length and weight obtained a percentage value of 80%. This shows that the use of media can increase student activity, both in the cognitive, psychomotor, and affective aspects.
- j. Conformity with student cognitive gets a percentage of 80%. This shows that the popscra book media topic is correct so that it can improve students' memory and understanding of concepts.
- k. The accuracy of using the illustrations obtained a percentage value of 80%. This shows that the use of illustrations in development is correct.
- 1. The suitability of the evaluation questions with the material obtained a percentage value of 80%. This shows that the evaluation questions are in accordance with the material.
- m. The language (spelling, punctuation, vocabulary, sentences, and paragraphs) used in the learning media obtained a percentage value of 80%. This shows that usage is in accordance with the rules and terms used in the book. So that it can improve the conceptual understanding of grade IV SD / MI students.
- n. The clarity of the material or the completeness of the material content obtained a percentage value of 80%. This shows that the delivery of material on Popscra book media is very easy to understand.

In addition to the quantitative data that has been described above. The qualitative data in the form of suggestions and criticisms from content experts, namely use of simpler sentences and include types of questions that contain character values and HOTS. The existence of these criticisms and

suggestions aims to improve and perfect the mnemonic-based popscra book media.

# 2. Analysis of Media Design Expert Validation Results

The evaluation of the design validation test from popscra book media was carried out by a lecturer at FITK UIN Maulana Malik Ibrahim Malang who is competent in the field of learning media, namely Mr. Galih Puji Mulyoto, M. Pd. The results of the validation test given by the media design expert showed a percentage value of 85%. This shows that Popscra book media is declared good and does not need revision. The following results of the validation by Popscra Book media design experts will be described in detail as follows:

- a. Cover design according to the content of the material gets a percentage of 80%. This shows that cover design on the instructional media is in accordance with content of the material.
- b. The cover type used gets a percentage of 80%. This shows that the type of letter on the cover is in accordance with the characteristics of grade 4 students.
- c. The cover letter size used gets a percentage of 100%. This shows that the letter size is correct and in accordance with the characteristics of grade 4 students.
- d. Not using too many font combinations gets a 100% percentage. This shows the suitability of the use of fonts.
- e. Placement of the consistency layout elements based on the title and subchapter spacing layout and the typing of the material obtained a percentage of 80%. This shows that the placement is in accordance with the Popscra book learning media.
- f. The clarity of typing writing gets a percentage of 80%. This shows that typing writing is clear when used on the media.
- g. The use of clear images, get a percentage of 80%. This shows that the use of images is clear and appropriate for use in popscra book media.

- h. Image placement accuracy gets a percentage of 80%. This indicates that the image layout is correct and uniform.
- i. Image size accuracy gets a percentage of 80%. This indicates that the image size on popscra book media is correct.
- j. The combination of images and text gets a percentage of 80%. This shows that the use of images and text is uniform in popscra book media.
- k. Color selection, font, and background get a percentage of 80%. This shows that the color, typeface, and background can attract students' attention.
- 1. The table quality in the product gets a percentage of 100%. This shows that the table used is very suitable and very well used in the media.
- m. The consistency of using spaces, titles, and typing of material obtained a percentage of 80%. This shows that it is good and appropriate to use.
- n. The layout accordingly gets a percentage of 80%. This shows that the layout is suitable for use in popscra book media.
- o. The overall appearance of the product is attractive to a percentage of 100%. This shows that the appearance of the product is attractive and appropriate.

In addition to the quantitative data that has been described above. The qualitative data in the form of suggestions and criticisms from design experts, namely include the HOTS question types. So that following the criticism and suggestions, the researchers have improved the popscra book media.

# 3. Analysis of Learning Expert Validation Results

- a. The suitability of the topic formulations in product development obtained a percentage of 80%. This shows that the topics in the media are in accordance with the curriculum.
- b. Make it easier for teachers to learn to get a percentage of 80%. This shows that the poscra book media helps in delivering learning materials.
- c. Helping the teacher in delivering the material to get a percentage of 100%.This shows that it helps teachers in the learning process.

- d. The conformity of the material content with KI and KD obtained a percentage of 80%. This shows that the content of the material is in accordance with KI and KD.
- e. The systematic suitability of the description of the learning content obtained a percentage of 80%. This shows that the content of the material is in accordance with the media topic.
- f. The suitability of the size and type of letters used in the learning media obtained a percentage of 80%. This shows that the size and type of letters are appropriate and appropriate to the characteristics of SD / MI class students.
- g. The suitability of the image or illustration with the material is 100%. This shows that the image is very suitable.
- h. The language used communicative gets a percentage of 100%. This shows that the language used by the media is interesting.
- i. The accuracy of the material presented obtained a percentage of 80%. This shows that the material used is correct.
- j. The accuracy of the evaluation used obtained a percentage of 80%. This shows that popscra book media can improve students' memory and understanding of learning concepts.

In addition to the quantitative data that has been described above. The qualitative data in the form of suggestions and criticisms from learning experts, which are then analyzed and considered by the researcher not, revising popscra book media.

Based on the results of the validation analysis of content experts, design experts, and learning experts that have been described above, it is very in accordance with the theory put forward by Azhar Arsyad, namely the use of learning media in the teaching and learning process can help increase and direct student attention, resulting in learning motivation, individual interaction. with the environment directly. In addition, it helps teachers to clarify the presentation of information and messages so that the learning process runs

smoothly, helps students improve understanding and student learning outcomes increase. <sup>68</sup>

# B. Results of the Popscra-Book Learning Media Interesting

After using popscra book learning media, the experimental class was given a media assessment questionnaire. This was done to determine the student's assessment of the attractiveness of popscra book learning media. The results of the assessment given to 10 students with a percentage achievement of 87% proved that the media reached attractive and valid criteria. The results of the attractiveness assessment are as follows:

- 1. The question that students feel happy when learning gets a percentage of 87.5%. This shows that the popscra book media used falls into the attractive criteria because students feel happy when doing learning activities using the popscra book media.
- 2. The question that students feel more enthusiastic when learning gets a percentage of 90%. This shows that the popscra book media used falls into the attractive criteria because students feel the enthusiasm for learning when carrying out learning activities using popscra book media.
- 3. The question that students find it easier to understand the subject matter gets a percentage of 82.5%. This shows that the media is made by analyzing the material with competency standards and basic competencies for grade IV SD/MI subjects. In addition, the material is presented sequentially based on the level of difficulty to make it easier for students to understand the material. So that in the learning process students find it easier to understand the material using the popscra book learning media.
- 4. The question that the popscra book media is in accordance with the unit of length and weight unit material gets a percentage of 85%. This shows that the media was made by adjusting the material to the competency standards

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<sup>&</sup>lt;sup>68</sup>Azhar Arsyad, *Media Pengajaran* (Jakarta: PT Raja Grafindo, 1997), p. 26

- and basic competencies of the fourth-grade SD/MI subjects. So that in mathematics learning poses popscra book media has a good appeal.
- 5. The question that the language used by the media is easy to understand obtained a percentage of 92.5%. This shows that the use of language has been adjusted to the character of the fourth-grade students of SD/MI. Namely by using light language, so that it is easy to understand and does not cause misunderstanding to students.
- 6. The question about pictures and content of learning media get a percentage of 85%. This shows that the images selected in this popscra book media are considered attractive by students and help students remember the material. All media contents, both in the form of letter styles and font sizes, are appropriate, making it easier for students to understand the reading of the material in the media. So that it can attract students in learning and feel bored during the learning process.
- 7. The question that students feel interested in participating in learning gets a percentage of 87.5%. This shows that popscra book media is included in the attractive criteria. So that students feel an interest in taking part in the learning process using the popscra book learning media.

Learning media is anything that can be used as an introduction or intermediary from sender to recipient or a tool that carries information or subject matter or messages that can stimulate thoughts, feelings and willingness, which aims to make it easier to achieve learning goals. <sup>69</sup> The level of pleasure of students using popscra book media gained 87.5% points, the level of enthusiasm for students using popscra book media gained 90% points. The level of convenience experienced by students using popscra book media earned 82.5% points. The material conformity level gets 85% points. The level of use of language that was easily understood earned 92.5% points. The level of pictures and the media made it easier for students to use popscra book media

 $<sup>^{69}</sup>$  Jamil Suprihatiningrum,  $Strategi\ Pembelajaran\ Teori\ dan\ Aplikasi$  (Jogjakarta: Ar-Ruzz Media, 2017), p. 319.

to get 85% points. The level of student interest in using popscra book media earned 87.5% points.

The results of media attractiveness based on student assessments obtained a score of 87%. This is based on the assessment table of media attractiveness included in the good category. The attractiveness of this media is supported by the method of making the media which produces attractive cartoon pictures and the movement of each scraft model. Although cartoon images can be seen through sophisticated technology such as cellphones or can be searched on the internet. However, this book is also equipped with material that is suitable for learning objectives. The material for units of length and weight is combined with cartoon characters to make it easy for students to remember and understand the material. So that the learning process is carried out meaningfully in the memory of students.

According to the results of this attractiveness, the researchers analyzed that the popscra book media had advantages that other media did not have. Among them are:

- 1. Learning is more attractive to elementary students.
- 2. Practical, because the use of popscra media can be repeated so that it can increase clarity.
- 3. Effective, because the messages conveyed are fast and easy to understand and remember the students.
- 4. The material in it is more focused on the problem.
- 5. Able to act as a storyteller that can provoke students' memory skills.
- 6. Can motivate students in learning.

Based on the explanation above, the use of popscra-book media in learning material units of length and weight is interesting according to students. This is reinforced by the form of media that is equipped with attractive images as well as content according to the subject which attracts students to the enthusiasm for learning. Also, the media and the language used to make it easier for students to understand the content of the material, because the questions presented are by students with sufficient difficulty levels. So that students feel

happy, interested, and motivated when learning takes place using the popscra book learning media.

Based on the explanation above, the use of popscra book media in learning material units of length and weight is interesting according to students. This is reinforced by the form of media that is equipped with attractive images as well as content according to the subject which attracts students to the enthusiasm for learning. In addition, the media and the language used to make it easier for students to understand the content of the material, because the questions presented are in accordance with students with sufficient levels of difficulty. So that students feel happy, interested and motivated when learning takes place using the popscra book learning media.

# C. Differences in Learning Outcomes for Students Who Learn Using Popscra Book Media and Students Who Do Not Use Media

After conducting field trials at SDN Sumberkembar Mojokerto, the average pre-test score in the experimental class was 54.5 which was included in the failure criteria. Then the average post-test score in the experimental class is to get 85.5 which indicates good criteria. Meanwhile, the control class obtained the same pre-test results as the experimental class with an average score of 54.5 which indicates that the criterion failed. Furthermore, the post-test obtained by the control class got an average value of 72.5. This shows that there is a difference between the mean value of the experimental class and the control class.

In addition, the analysis was also carried out through a significance test on student learning outcomes data. Manual t-test analysis showed the result of t count was 4.033, and then the hypothesis was tested using the significance level of 0.05 or 5% with the degree of coefficient (dk) 18 on the t table showing 2.100. Then it matters H0 is rejected and  $H_1$  is accepted, which means that there is a significant difference between students who use popscra book media and students who don't use popscra book media.

This is also clarified again by an analysis using SPSS which shows that the p-value (sig) of *levene's test for equality of variances* equal to 0.817, or greater than the value 0.05. Then carried out the homogeneity test with the rule of sig value: p > 0.05, it can be said that the variance of the two classes is the same. Furthermore, from the SPSS analysis, it is known that the sig. (2-tailed) on the equal variances assumed line with a value of 0.001, then create a hypothesis and perform t-test using the 0.05 or 5% significance level rule. From sig. (2-tailed) obtained shows the results are smaller than the significance level of 0.05, which means that  $H_0$  is rejected and  $H_1$  is accepted. So it can be concluded that there is a significant difference from the average score of student learning outcomes using popscra book media in the experimental class and those who do not use popscra book media in the control class.

Some of the factors that make this media can improve student learning outcomes, one of which is the media selection criteria based on aspects including the suitability of objectives, the state of students, the appropriateness of use, availability, teacher skills, and technical use. This media has met the above criteria so that it can help improve student learning outcomes. This is also strengthened through the suitability of the media with learning objectives. When a media is made by adjusting the learning objectives, the media can also help achieve the goals of learning. When learning objectives can be achieved, it can be directly proportional to the increase in student learning outcomes.

In making these media, researchers also consider the use of color. The use of attractive colors can add to the attractiveness of students. This is reinforced by the theory that in children or less intelligent people, colors can generate interest and generate motivation to read, observe reading.<sup>71</sup> So that this media is made by adjusting the level of thinking of students that are concrete and interesting. Media that attracts students' attention will support

 $<sup>^{70}</sup>$  Musfiqon,  $Pengembangan\ Media\ Dan\ Sumber\ Pembelajaran\ (Jakarta: Prestasi Pustakarya, 2012), p. 116-117.$ 

<sup>&</sup>lt;sup>71</sup> B. P Sitepu, *Penulisan Buku Teks Pelajaran* (Bandung: Rosdakrya, 2014), p. 152.

students to focus on learning and be able to help improve student learning outcomes.

This media is presented in the form of a pop-scraft book that can improve student learning outcomes. This media is also equipped with material descriptions and evaluation questions. The existence of pictures of measuring instruments for each unit arises according to the original picture, and the opening technique of each part of the material can help students remember the sequence of units of length and weight, sharpening the students' brains in understanding each sub-material. The presentation of story questions is packaged in the form of a story that has a relationship with students' daily lives so that students can more easily understand the material if it is related to issues that are closely related in real life.

#### **CHAPTER VI**

#### **CLOSING**

#### A. Conclusion

Based on the research results that have been described in the previous chapter regarding the development of popscra book learning media based on mnemonics, unit length and weight unit material in grade IV SDN Sumberkembar Mojokerto can be concluded as follows:

- 1. The popscra book learning media specifications in this research and development include a cover. Foreword, instructions for use, material for units of length and weight (definition of units of length and unit of weight, relationships between units, reminders between units, unit ladders, conversion tables for each unit, pictures of measuring instruments for each unit), evaluation of learning from each unit, regarding the author, and finally the back page of the book which contains a brief content about the media and some motivational words. This media was tested on three validators, namely content experts, design experts, learning experts. The results of the evaluation by content experts obtained 80%, the results of the design experts' assessment obtained a value of 85%, and the results of the assessment by the learning experts obtained 86%.
- 2. The attractiveness of the popscra book media based on the results of the fourth-grade students' assessment of SDN Sumberkembar Mojokerto obtained a score of 87%. This shows that students are interested in the popscra book media. This media is considered attractive because it is presented in a simple form in the form of a book, which is equipped with pictures and techniques for opening each section that attracts students to learn and understand each material presented.

3. Based on the results of product trials conducted on the experimental class and the control class. Popscra book media developed by researchers can improve student learning outcomes, this can be seen from the results of the post-test. So that it is suitable for use in learning. The results of the t-test which was carried out manually using the formula and using SPSS showed that the average post-test score of the control class was 72.5 and the experimental class was 85.5. In making a decision, it can be seen from the significance if t<sub>count</sub>> t<sub>table</sub> = 4.033> 2.100 proves that it is very significant. This shows that popscra book media can improve student learning outcomes because the presentation of this media is interesting. Detailed material description with the opening technique of each interesting part of the material, accompanied by pictures of the measuring instrument for each unit, can help students remember the sequence of units of length and weight. So that students easily understand the questions and understand the relationship between units.

# **B.** Suggestion

Based on the results of research on the development of learning media popscra book based on mnemonics of unit length and weight units in grade IV which was conducted at SDN Sumber embar Mojokerto. Suggestions that can be given include suggestions for product utilization purposes and further development suggestions. In detail, the following is an explanation regarding the suggestions:

- 1. Popscra book media can be used in other learning as an interesting learning media. So that it can improve student understanding and learning outcomes.
- 2. Popscra book media is only limited to material units of length and weight, it needs to be developed for material units of time, units of volume, and other measurement materials.

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# APPENDIX 1 EVIDANCE OF CONSULTATION

# EVIDANCE OF CONSULTATION

Name : Vivy Endang Try Santi

NIM : 161400058

Department : Islamic Elementary School Teacher Education

Advisor : Nuril Nuzulia, M. Pd. I

Title of Thesis : The Development of Popscra Book Learning Media Based

on Mnemonic Strategies on Measurement Materials to

Improve Student Learning in Grade 4 SDN

Sumberkembar Mojokerto

Date	Consultation Materials	Signature
March, 19th 2020	Design of Media	C-04
July, 25th 2020	ACC Media	(104
July, 29th 2020	ACC Intrument, Pre Test & Post Test	( P)
August, 4th 2020	Chapter I	C+04
September, 4 <sup>th</sup> 2020	Chapter IV-VI	C-04
September, 5th 2020	Chapter I-VI	Col
September, 6 <sup>th</sup> 2020	Abstract	C-04
September, 8th 2020	ACC	Cide
	March, 19 <sup>th</sup> 2020 July, 25 <sup>th</sup> 2020 July, 29 <sup>th</sup> 2020 August, 4 <sup>th</sup> 2020 September, 4 <sup>th</sup> 2020 September, 5 <sup>th</sup> 2020 September, 6 <sup>th</sup> 2020	March, 19th 2020  Design of Media  July, 25th 2020  ACC Media  July, 29th 2020  ACC Intrument, Pre Test & Post Test  & Post Test  Chapter I  September, 4th 2020  Chapter IV-VI  September, 5th 2020  Chapter I-VI  September, 6th 2020  Abstract

Malang, September 8th 2020

Advisor,

Nuril Nuzulia, M.Pd. I

NIP. 19900423 20160801 2 014

# APPENDIX 2 LETTER OF RESEARCH PERMISSION



## KEMENTERIAN AGAMA REPUBLIK INDONESIA UNIVERSITAS ISLAM NEGERI MAULANA MALIK IBRAHIM MALANG

# FAKULTAS ILMU TARBIYAH DAN KEGURUAN

Jalan Gajayana 60, Telepon (0341) 552398 Faximile (0341) 552398 Malang

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: 1250 /Un.03.1/TL.00.1/07/2020 Silat

Penting

Lampiran : \*

: Izin Penelitian Hat

Yth. Kepala SDN Sumberkembar Pacet

M o jo ke rto

Assalam u'alaikum Wr. Wb.

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

Nama : Vivy Endang Try Santi

NIM : 16140058

: Pendidikan Guru Madrasah Ibtidaiyah (PGMI)

Semester - Tahun Akademik : Genap - 2019/2020

Judul Skripsi : The Development of Popscra Book Learning

> Media Based on Mnemonic Strategies On Measurement Waterials to Improve Student

20 Juli 2020

Learning In Grade 4 SDN Sumberkembar

: Juli 2020 sampai dengar Agustus 2020 Lama Penelitian

(2 bulan)

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

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

Wassalamu'alalkum Wr. Wb.

Dr. H. Agus Maimun. M.Pd NIP. 19650817 199803 1 003

## Tembusan :

- Yth. Ketua Jurusan PGMI
- 2. Arsip

# APPENDIX 3 LETTER OF RESEARCH AT SDN SUMBERKEMBAR MOJOKERTO



# PEMERINTAH KABUPATEN MOJOKERTO DINAS PENDIDIKAN

# SEKOLAH DASAR NEGERI SUMBERKEMBAR NO. 404

Alamat: Jl. Kertorejo No.01, Ds. Sumberkembar Kec. Pacet, Kab. Mojokerto. Kode Pos: 61374

# SURAT KETERANGAN TELAH MELAKUKAN PENELITIAN

Nomor: 421.2/ 078 /416.101.35.03.17.SD/404/2020

Yang bertanda tangan dibawah ini:

Nama

: SUHARNO, S. Pd

NIP

: 19620520 198303 1 014

Jabatan

: Kepala Sekolah

Menerangkan dengan sebenarnya bahwa mahasiswa tersebut di bawah ini:

Nama

: Vivy Endang Try Santi

NIM

: 16140058

Fakultas

: Ilmu Tarbiyah dan Keguruan

Jurusan

: Pendidikan Guru Madrasah Ibtidaiyah

Semester

: Sembilan (IX)

Benar-benar telah mengadakan penelitian pengembangan dengan judul "Media Popscra Book Berbasis Mnemonik pada Materi Pengukuran untuk Meningkatkan Hasil Belajar Siswa Kelas IV SDN Sumberkembar Mojokerto" dalam rangka menyelesaikan tugas akhir perkuliahan di Universitas Islam Negeri Maulana Malik Ibrahim Malang.

Demikian surat keterangan ini kami buat dengan sebenarnya, agar dapat dipergunakan sebagaimana mestinya.

Mojokerto, 7 September 2020

cepala SDN SUMBERKEMBAR

SUHARNO, S. Pd

NIP. 19\$20520 198303 1 014

# APPENDIX 4 LETTER OF APPLICATION VALIDATOR





# KEMENTERIAN AGAMA UNIVERSITAS ISLAM NEGERI MAULANA MALIK IBRAHIM MALANG

# FAKULTAS ILMU TARBIYAH DAN KEGURUAN

Jalan Gajayana 50, Telepon (0341) 552398 Faximile (0341) 552398 Malang http://tarbiyah.uin-malang.ac.id. email: fitk@uinmalang.ac.id

24 Juli 2020

: 930 /Un. 3.1/PP.03.1/07/2020 Nomor

Lampiran

Perihal : Permohonan Menjadi Validator

Kepada

Yth. <del>Dapale</del>/Ibu. Ria Norfika Yuliandari, M. Pd

di -

Tempat

Assalamualaikum Wr. Wb.

Sehubungan dengan proses penyusunan skripsi mahasiswa berikut:

Nama : Vivy Endang Try Santi

NIM : 16140058

Program Studi : Pendidikan Guru Madrasah Ibtidaiyah

Judul Skripsi : The Development of Popscra Book Learning Media

> Based on Mnemonic Strategies on Measurement Materials to Improve Student Learning in Grade 4 SDN

Sumberkembar

: Nuril Nuzulia M.Pd Dosen Pembimbing

maka dimohon Bapak/Ibu berkenan menjadi validator skripsi tersebut. Adapun segala hal berkaitan dengan apresiasi terhadap kegiatan validasi sebagaimana dimaksud sepenuhnya menjadi tanggung jawab mahasiswa bersangkutan.

Demikian Permohonan ini disampaikan, atas perkenan dan kerjasamanya yang baik disampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.







# KEMENTERIAN AGAMA

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Nomor : 930 /Un. 3.1/PP.03.1/07/2020 24 Juli 2020

Lampiran :

Perihal : Permohonan Menjadi Validator

Kepada

Yth. Bapak/Ibu. Galih Puji Mulyoto, M. Pd

di -

Tempat

Assalamualaikum Wr. Wb.

Sehubungan dengan proses penyusunan skripsi mahasiswa berikut:

Nama : Vivy Endang Try Santi

NIM : 16140058

Program Studi : Pendidikan Guru Madrasah Ibtidaiyah

Judul Skripsi : The Development of Popscra Book Learning Media

Based on Mnemonic Strategies on Measurement Materials to Improve Student Learning in Grade 4 SDN

Sumberkembar

Dosen Pembimbing : Nuril Nuzulia M.Pd

maka dimohon Bapak/Ibu berkenan menjadi validator skripsi tersebut. Adapun segala hal berkaitan dengan apresiasi terhadap kegiatan validasi sebagaimana dimaksud sepenuhnya menjadi tanggung jawab mahasiswa bersangkutan.

Demikian Permohonan ini disampaikan, atas perkenan dan kerjasamanya yang baik disampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.







## KEMENTERIAN AGAMA

# UNIVERSITAS ISLAM NEGERI MAULANA MALIK IBRAHIM MALANG

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Nomor : 930 /Un. 3.1/PP.03.1/07/2020 24 Juli 2020

Lampiran : -

Perihal : Permohonan Menjadi Validator

Kepada

Yth. Bapak/Ibu.Topo, S. Pd

di-

Tempat

Assalamualaikum Wr. Wb.

Sehubungan dengan proses penyusunan skripsi mahasiswa berikut:

Nama : Vivy Endang Try Santi

NIM : 16140058

Program Studi : Pendidikan Guru Madrasah Ibtidaiyah

Judul Skripsi : The Development of Popscra Book Learning Media

Based on Mnemonic Strategies on Measurement Materials to Improve Student Learning in Grade 4 SDN

Sumberkembar

Dosen Pembimbing : Nuril Nuzulia M.Pd

maka dimohon Bapak/Ibu berkenan menjadi validator skripsi tersebut. Adapun segala hal berkaitan dengan apresiasi terhadap kegiatan validasi sebagaimana dimaksud sepenuhnya menjadi tanggung jawab mahasiswa bersangkutan.

Demikian Permohonan ini disampaikan, atas perkenan dan kerjasamanya yang baik disampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.



# APPENDIX 5 INSTRUMENT OF MATHEMATICS LEARNING EXPERT VALIDATION

# RATRAI

## INSTRUMEN VALIDASI AHLI ISI

# A. Pengantar

Berkaitan dengan pelaksanaan penelitian dan pengembangan media pembelajaran satuan panjang dan satuan berat dikelas IV berupa media popscra book, maka peneliti bermaksud untuk mengadakan validasi media pembelajaran yang telah diproduksi sebagai media dalam proses pembelajaran. Oleh sebab itu, dimohon kesediaan Bapak/Ibu mengisi angket dengan format dibawah ini sebagai ahli isi. Tujuan dari pengisian angket ini adalah untuk mengetahui kesesuaian pemanfaatan media pembelajaran dan sebagai pengukuran kelayakan media pembelajaran sehingga layak digunakan. Atas kesediaannya, saya ucapkan terimakasih.

Nama : Ria Norfika Yuliandari, M. Pd

NIP : 19860720 201503 2 003

Instansi : FITK-UIN Maulana Malik Ibrahim Malang

Pendidikan : S2 Pendidikan Matematika SD

# B. Petunjuk Pengisian Angket

- Sebelum mengisi angket ini, mohon terlebih dahulu membaca atau mempelajari bahan ajar yang dikembangkan.
- Intrumen ini terdiri kolom pertanyaan dan kolom jawaban. Silahkan tandai salah salah satu jawaban yang sesuai dengan pernyataan anda dengan menggunakan tanda centang (✓)
- 3. Keterangan makna pada huruf pilihan adalah sebagai berikut

Skor	Keterangan
5	Sangat tepat, sangat sesuai, sangat jelas, sangat menarik, sangat mudah
4	Tepat, sesuai, jelas, menarik, mudah
3	Cukup tepat, cukup sesuai, cukup jelas, cukup menarik, cukup mudah
2	Kurang Tepat, kurang sesuai, kurang jelas, kurang menarik, kurang mudah
1	Sangat tidak tepat, sangat tidak sesuai, sangat tidak jelas, sangat tidak menarik

# C. Penilaian

B.T.	Aspek yang Dinilai	Keterangan					
No		1	2	3	4	5	
1	Kesesuaian topik pada pengembangan media pembelajaran				<b>V</b>		
2	Keruntutan penyajian materi				1		
3	Kesesuaian dengan Standar Kompetensi dan Kompetensi Dasar				1		
4	Kesesuaian dengan indikator dan tujuan pembelajaran				4		
5	Kesesuaian isi materi dengan gambar				1		
6	Pendukung materi pembelajaran				1		
7	Kejelasan deskripsi petunjuk penggunaan				1		
8	Ukuran huruf yang digunakan sesuai dengan siswa kelas IV				1		
9	Kesesuaian media dalam memfasilitasi pemahaman siswa terhadap satuan panjang dan berat				1		
10	Kesesuaian dengan kognitif siswa				1		
11	Ketepatan penggunaan ilustrasi				1		
12	Kesesuaian soal evaluasi dengan materi;				1		
13	Bahasa (ejaan, tanda baca, kosa kata, kalimat, dan paragraph) sesuai dengan kaidah dan istilah yang digunakan buku				~		
14	Kejelasan materi atau kelengkapan isi materi				~		

# D. Kriteria-kriteria Angket

Berdasarkan penilaian diatas, maka saya menyatakan bahwa media pembelajaran ini:

- □ Dapat digunakan tanpa revisi
- ☑ Dapat digunakan dengan revisi kecil
- □ Dapat digunakan dengan revisi besar
- ☐ Belum dapat digunakan

## E. Saran

- Penggunaan kalimat dan kata ganti sebaiknya lebih sederhana dan mengena kepada pembaca. Ananda menjadi siswa.
- Dalam soal-soal evaluasi cantumkan nilai-nilai karakter, muatan positif yang ringan dan real, yang ada dalam kehidupan sehari-hari, serta yang mengasah logika siswa.

Malang, 6 Agustus 2020

Validator

Ria Norfika Yuliandari, M. Pd.

NIP. 19860720 201503 2 003

# APPENDIX 6 INSTRUMENT OF DESIGN MEDIA EXPERT VALIDATION

# INSTRUMEN VALIDASI AHLI DESAIN

# A. Pengantar

Berkaitan dengan pelaksanaan penelitian dan pengembangan media pembelajaran satuan panjang dan satuan berat dikelas IV berupa media popsera book, maka peneliti bermaksud untuk mengadakan validasi media pembelajaran yang telah diproduksi sebagai media dalam proses pembelajaran. Oleh sebab itu, dimohon kesediaan Bapak/Ibu mengisi angket dengan format dibawah ini sebagai ahli desain. Tujuan dari pengisian angket ini adalah untuk mengetahui kesesuaian pemanfaatan media pembelajaran dan sebagai pengukuran kelayakan media pembelajaran sehingga layak digunakan. Atas kesediaannya, saya ucapkan terimakasih.

Nama : Galih Puji Mulyoto, M. Pd NIP : 19880322 20180201 1 146

Instansi : FITK-UIN Maulana Malik Ibrahim Malang

# B. Petunjuk Pengisian Angket

Pendidikan

- Sebelum mengisi angket ini, mohon terlebih dahulu membaca atau mempelajari bahan ajar yang dikembangkan.
- Intrumen ini terdiri kolom pertanyaan dan kolom jawaban. Silahkan tandai salah salah satu jawaban yang sesuai dengan pernyataan anda dengan menggunakan tanda centang (✓)

: S2 Pendidikan Pancasila dan Kewarganegaraan

3. Keterangan makna pada huruf pilihan adalah sebagai berikut

Skor	Keterangan
5	Sangat tepat, sangat sesuai, sangat jelas, sangat menarik, sangat mudah
4	Tepat, sesuai, jelas, menarik, mudah
3	Cukup tepat, cukup sesuai, cukup jelas, cukup menarik, cukup mudah
2	Kurang Tepat, kurang sesuai, kurang jelas, kurang menarik, kurang mudah
1	Sangat tidak tepat, sangat tidak sesuai, sangat tidak jelas, sangat tidak menarik

# C. Penilaian

NI-	4 31 31 11	Alternatif jawaban				
No	Aspek yang dinilai	1	2	3	4	5
1	Desain sampul sesuai dengan isi materi				1	
2	Jenis huruf sampul yang digunakan sesuai dengan siswa kelas 4				1	
3	Ukuran huruf sampul yang digunakan sesuai dengan siswa kelas 4			3		1
4	Tidak menggunakan terlalu banyak kombinasi jenis huruf					1
5	Penempatan unsur tata letak konsistensi berdasarkan tata letak spasi judul dan sub bab dan pengetikan materi				1	
6	Kejelasan tulisan pengetikan				1	
7	Penggunaan gambar jelas dan sesuai dengan karakteristik siswa kelas 4				1	
8	Ketepatan penempatan gambar				1	
9	Ketepatan ukuran gambar				1	
10	Keterpaduan gambar dan teks				1	
11	Pemilihan warna, jenis huruf, dan background				1	
12	Kualitas tabel dalam produk			3		1
13	dan pengetikan materi				1	
14	Tata letak sesuai			2	1	
15	Keseluruhan tampilan produk menarik					~

D.	Kriteria-kriteria Angket
	Berdasarkan penilaian diatas, maka saya menyatakan bahwa media
	pembelajaran ini:
	☐ Dapat digunakan tanpa revisi
	☑ Dapat digunakan dengan revisi kecil
	☐ Dapat digunakan dengan revisi besar
	☐ Belum dapat digunakan
E.	Saran
	Perlu ada petunjuk penggunaan media nya kunci jawaban dan soal2 yg hots
	Tulisan ukuran 16

Malang, 4 Agustus 2020

Validator /

Galib Puji Multoto, M. Pd.

NIP. 19880322 20180201 1 146

# APPENDIX 7 INSTRUMENT OF FIFTH GRADE MATHEMATICS SUBJECT TEACHER

## INSTRUMEN VALIDASI AHLI PEMBELAJARAN

# A. Pengantar

Berkaitan dengan pelaksanaan penelitian dan pengembangan media pembelajaran satuan panjang dan satuan berat dikelas IV berupa media popscra book, maka peneliti bermaksud untuk mengadakan validasi media pembelajaran yang telah diproduksi sebagai media dalam proses pembelajaran. Oleh sebab itu, dimohon kesediaan Bapak/Ibu mengisi angket dengan format dibawah ini sebagai ahli pembelajaran. Tujuan dari pengisian angket ini adalah untuk mengetahui kesesuaian pemanfaatan media pembelajaran dan sebagai pengukuran kelayakan media pembelajaran sehingga layak digunakan. Atas kesediaannya, saya ucapkan terimakasih.

Nama : Topo, S. Pd

NIP : 19780112 200801 1 010

Instansi : SDN Sumberkembar

Pendidikan : S1 Pendidikan Guru Sekolah Dasar

# B. Petunjuk Pengisian Angket

- Sebelum mengisi angket ini, mohon terlebih dahulu membaca atau mempelajari bahan ajar yang dikembangkan.
- Intrumen ini terdiri kolom pertanyaan dan kolom jawaban. Silahkan tandai salah salah satu jawaban yang sesuai dengan pernyataan anda dengan menggunakan tanda centang (✓)
- 3. Keterangan makna pada huruf pilihan adalah sebagai berikut

Skor	Keterangan
5	Sangat tepat, sangat sesuai, sangat jelas, sangat menarik, sangat mudah
4	Tepat, sesuai, jelas, menarik, mudah
3	Cukup tepat, cukup sesuai, cukup jelas, cukup menarik, cukup mudah
2	Kurang Tepat, kurang sesuai, kurang jelas, kurang menarik, kurang mudah
1	Sangat tidak tepat, sangat tidak sesuai, sangat tidak jelas, sangat tidak menarik

# TANTA I IRE

# C. Penilaian

NI.		Keterangan					
No	Aspek yang Dinilai	1	2	3	4	5	
1	Kesesuaian rumusan topik pada pengembangan produk				1		
2	Memudahkan guru dalam pembelajaran				1		
3	Membantu guru dalam menyampaikan materi					1	
4	Kesesuaian isi materi dengan KI dan KD				1		
5	Kesesuaian sistematika uraian isi pembelajaran				1		
6	Kesesuaian ukuran dan jenis huruf yang digunakan dalam media pembelajaran				1		
7	Kesesuaian gambar atau ilustrasi dengan materi					1	
8	Bahasa yang digunakan komunikatif					1	
9	Ketepatan materi yang disajikan dapat memberikan motivasi belajar kepada siswa				1		
10	Ketepatan evaluasi yang digunakan dapat mengukur kemampuan siswa				1		

# D. Kriteria-kriteria Angket

Berdasarkan penilaian diatas, maka saya menyatakan bahwa media pembelajaran ini:

Ø	Dapat digunakan tanpa revisi
	Dapat digunakan dengan revisi kecil
	Dapat digunakan dengan revisi besar
	Belum dapat digunakan

# E. Saran

	Media pembelajaran bagus, membantu guru dalam pembelajaran.
	Saran saya jika menggunakan media <i>popscra book</i> untuk jumlah
•••••	siswa yang banyak, agar digandakan atau ukuran buku, gambar dan
•••••	tulisan yang diperbesar
•••••	

Mojokerto, 12 Agustus 2020

Validator

NIP. 19780112 200801 1 010

# APPENDIX 8 INSTRUMENT OF FIELD TRIAL QUESTIONNAIRES

# INSTRUMEN VALIDASI OLEH SISWA

	ia jar Secara mpok Belajar	Therig Luring Sumbe	rsvko		
A. 1	Petunjuk Pengi	sian Angket			
	1. Sebelum me	ngisi angket ini r	mohon terlebih	h dahulu, adik-adik mempelajari media popscra book	yang
	dikembangk	an.			
	2. Berilah tand	(x) pada salah s	satu huruf a, b,	, c atau d pada jawaban yang sesuai dengan penilaian	
	yang adik an	ggap paling tepa	ıt.		
	<ol><li>Kecermatan</li></ol>	dalam penilaian	ini sangat diha	arapkan	
R	Pertenyaan ne	tanyaan Angke		8.	
				ran matematika dengan menggunakan media	
	pembelajaraj	n popscra Book i	ni?	ran matematika dengan menggunakan media	
		dak senang		ang	
		enang		gat senang	
				elajaran popscra book ini, dapat menambah semangat	
	adik dalam b		i incuia penno		
		dak memberi sen	nangat	A Samuel	
	b. Kurang s		nangar	. Semangat	
			nonscra book i	d. Sangat semangat ini memudahkan adik dalam memahami materi pelajara	0
	a. Sangat ti	dak mudah	> Mud	ah	anr
	b. Kurang n			gat mudah	
	COLUMN TO THE COLUMN TO SERVE THE TOTAL PROPERTY.			ini sesuai dengan materi satuan panjang dan satuan ber	-+2
	a. Sangat ti	dak sesuai	c. Sesu		atr
	b. Kurang s		≯d. Sang	TO THE RESERVE OF THE PERSON O	
	<ol><li>Apakah Baha</li></ol>	asa yang digunak	an dalam medi	ia pembelajaran popscra book ini dapat dengan mudah	
	adik pahami'	?			
	a. Sangat tida		c. Muda		
	b. Kurang m		d. Sang	gat mudah	
	<ol><li>Apakah gam materi?</li></ol>	baı dan isi dari m	nedia pembelaja	aran popscra book memudahkan adik dalam mengingat	t
	a. Sangat tida	ak mudah	C. Mude	ah	
	b. Kurang m		d. Sanga	at mudah	
	<ol><li>Apakah adik</li></ol>	merasa tertarik n	nengikuti pemb	belajaran materi satuan panjang dan perat dengan	
	menggunaka	n media popsera	book?	· · · · · · · · · · · · · · · · · · ·	
	a. Sangat tida		c. Tertai	rik	
	b. Kurang ter	tarik	d. Sanga	at tertarik	

# APPENDIX 9 IDENTITY SUBJECTS OF TRIAL TEST

# DATA KELAS IV SDN SUMBERKEMBAR

NO	NAMA LENGKAP	KELAS
1	Cika Firdiana Putri	Kelas Eksperimen
2	Deva Putra Hermawansyah	Kelas Eksperimen
3	Fajar Aditya Putra	Kelas Eksperimen
4	Fania Khoirotul Ummah	Kelas Eksperimen
5	Hanum Puspita Sari	Kelas Eksperimen
6	Irfan Saputra	Kelas Eksperimen
7	Muhamad Rifki Afandi	Kelas Eksperimen
8	Muhamad Thoriq Sholikhul Ulah	Kelas Eksperimen
9	Muhammad Bahrudin Nicolas Saputra	Kelas Eksperimen
10	Salsabilla Putri Ramadhani	Kelas Eksperimen
11	Ammar Zafran Hartana	Kelas Kontrol
12	Cantika Engelaulia Shavira	Kelas Kontrol
13	Fanesa Dwi Rahmadani	Kelas Kontrol
14	Ferdiansyah Dwi Saputra	Kelas Kontrol
15	Muhammad Azzam Aufa Arizky	Kelas Kontrol
16	Muhammad Bagus Dwi Setiawan	Kelas Kontrol
17	Nova Three Yuda Putra	Kelas Kontrol
18	Salsabila Amelia Putri	Kelas Kontrol
19	Valensya Dwi Putri Wijaya	Kelas Kontrol
20	Vincent Marvelino Putra Febrian	Kelas Kontrol

# APPENDIX 10 PRE TEST CONTROL AND EXPERIMENT GROUP DATA



Nama

HOUNTH RET YUDA.

No.Absen

12

Kelompok Belajar

:Sumberkembar

Kategori Soal

: Pre-Test

# A. Isilah titik-titik berikut ini dengan benar!

- 2. 20 hm 2 10m
- 3. 16 cm = 0.0 dam
- 4. 1 m 10 cm + 80 mm = 0 cm
- 5. 4 dam + 100 dm 450 cm = 45h
- 6. 30 dm 2000 mm + 40 cm = 1.400

600 m + 50 km - 120 dam 6.05 mm

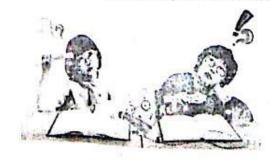
70+60=130:2

# B. Kerjakanlah soal cerita dibawah ini!

- . Fajri memiliki sebuah kayu setinggi 10 dm. Kemudian kayu tersebut dipotong 20 cm. Berapa cm panjang kayu yang dimiliki oleh sekarang? 170 (1)
  - 2 Paman memiliki dua tali. Masing-masing panjangnya 9 dm dan 120 cm. Tali tersebut akan digunakan untuk membuat jemuran sepanjang 5dm. berapa cm sisa panjang tali paman?
    165 2M
  - Panjang sebuah kain 7 m, kain tersebut dipotong 85 cm. Berapa sisa panjang kain tersebut?

# ~Selamat Mengerjakan~

Biasakanlah untuk jujur, karena kejujuran itu menuntun kita pada kebaikan. Dan kebaikan itu menuntun kita pada keselamatan.



Nama

HOVATHREE Yorda Patrono. Absen

17

. Pre-Test

Kelompok Belajat

:SUMBERKEM BAR

Kategori Soal

60

# A. Isilah titik-titik berikut ini dengan benar!

2. 5 hg = 
$$9.0$$
 dag

# B. Kerjakanlah soal cerita dibawah ini!

- 8. Ani mendapatkan buah manggis sebanyak 3000 gram dan buah jeruk 7200 gram, jika dikonversikan ke kilogram (kg), berapa kg buah-buahan yang didapatkan Ani 20/2.
- Ayah memindahkan beras sebanyak 90 karung yang beratnya masing-masing 30 kg. keesokan harinya ayah memberikan 7 kuintal beras kepada tetangganya. Sisa beras yang masih ayah miliki berapa kuintal?
- 10. Dina membeli bahan untuk membuat kue yakni minyak 5000 gram, gula 400 gram, beserta 5 kg terigu. Berapa kilogram total keseluruhan bahan yang harus dibeli oleh dina?

# ~Selamat Mengerjakan~

Tak ada harta pusaka yang sama berharganya dengan kejujuran.



# 70+60=130:2 (65)

Nama

: Nico

No.Absen

:16

Kelompok Belajar

: Sum ber Sulva

Kategori Soal

: Pre-Test

# A. Isilah titik-titik berikut ini dengan benar!

1. 4 m = 9.9 cm

2. 20 hm = ... m 2000

3. 16 cm = 1.5 dam

4. 1 m - 10 cm + 80 mm = 9 cm

5. 4 dam + 100 dm - 450 cm = 45 m

6.30 dm - 2000 mm + 40 cm = 2010mm

7.600 m + 50 km - 120 dam = 32 km

# B. Kerjakanlah soal cerita dibawah ini!

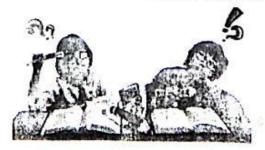
1. Fajri memiliki sebuah kayu setinggi 10 dm. Kemudian kayu tersebut dipotong 20 cm. Berapa cm panjang kayu yang dimiliki oleh andi sekarang? 200 m

2. Paman memiliki dua tali. Masing-masing panjangnya 9 dm dan 120 cm. Tali tersebut akan digunakan untuk membuat jemuran sepanjang 2m. berapa cm sisa panjang tali paman 160 cm

3. Panjang sebuah kain 7 m, kain tersebut dipotong 85 cm. Berapa sisa panjang kain tersebut? 615

# ~Selamat Mengerjakan~

Biasakanlah untuk jujur, karena kejujuran itu menuntun kita pada kebaikan. Dan kebaikan itu menuntun kita pada keselamatan.



Nama

: Nico

No.Absen

16

Kelompok Belajar

Sumber Sulto

Kategori Soal

: Pre-Test

# A. Isilah titik-titik berikut ini dengan benar!

$$4.2 dag - 16 dg + 80 cg = 192 dg$$

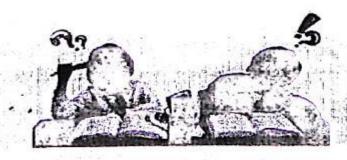
7. 
$$30 \text{ hg} + 2 \text{ kg} - 400 \text{ g} = 960 \text{ dag}$$

# B. Kerjakanlah soal cerita dibawah ini!

- 8. Ani mendapatkan buah manggis sebanyak 3000 gram dan buah jeruk 7200 gram, jika dikonversikan ke kilogram (kg), berapa kg buah-buahan yang didapatkan Ani? 12.000
- 9. Ayah memindahkan beras sebanyak 90 karung yang beratnya masing-masing 30 kg. keesokan harinya ayah memberikan 7 kuintal beras kepada tetangganya. Sisa beras yang masih ayah miliki berapa kuintal? 20
- 10. Dina membeli bahan untuk membuat kue yakni minyak 5000 gram, gula 400 gram, beserta 5 kg terigu. Berapa kilogram total keseluruhan bahan yang harus dibeli oleh dina? 5405 9 form

# ~Selamat Mengerjakan~

Tak ada harta pusaka yang sama berharganya dengan kejujuran.



# APPENDIX 11 POST TEST CONTROL AND EXPERIMENT GROUP DATA

90+90=180°2

Nama

: Nico

Kelompok Belajar

: Somber sulfa

No.Absen

Kategori Soal

: 16 : Post-Test

### A. Isilah titik-titik berikut ini dengan benar!

- 1. 4 km = ... dam 116m x 1000m=900 dom
- 2. 11 dm = ... mm | | Wm x los 1.100
- 3. 36 m = ... km 36:100 =0,036/im
- 4. 22 hm = ... m 22x 100=2.200 m
- 5. 2,5 m 16 cm + 80 mm = ... cm (2,5 x /co) 16 cm + (80:10)

7.  $790 \text{ m} + 50 \text{ km} - 120 \text{ dam} = ... \text{ hm} \frac{250 - 164 P - 242 Cm}{400 \text{ roch } 200 \text{ dam}} = ... \text{ hm} \frac{250 - 164 P - 242 Cm}{400 \text{ roch } 200 \text{ dam}} = ... \text{ hm} \frac{250 - 164 P - 242 Cm}{400 \text{ dam}} = \frac{250 - 164 P - 242 Cm}{400 \text{$ 

(70:100) 4(50=10) -(120:10)

### B. Kerjakanlah soal cerita dibawah ini!

 Seorang pemborong mendapatkan pekerjaan pengaspalan jalan sepanjang 15 km. Minggu pertama berhasil menyelesaikan 36 dam. Minggu kedua 5.436 m. Berapa meter Panjang pengaspalan jalan yang belum diselesaik un minggu 1= 36dom = 36x 10=360 mingg\_2= 5436 m

15,000 m - C 360+5936) m = 9209 2. Aisyah jalan kaki ke masjid untuk menunaikan sholat ied bersama keluarganya. Jarak rumah Aisyah ke masjid 1450 m. Aisyah bersama kel larganya sudah berjalan sejauh 850 dm. Berapa nieter lagi Aisyah bersama keluarganya sampai masjid?

1950-8501365 m

3. Farhan dan Amir berniat untuk mengikuti lomba renang antar sekolah. Syarat untuk menjadi peserta lomba harus memiliki tinggi minimal 140 cm. Tinggi badan Farhan 45 mm lebih tinggi dari batas minimal syarat perlombaan. Sedangkan tinggi badan Amir 4,2 cm lebih tinggi dari tinggi badan Farhan. Berapa cm selisih tinggi badan mereka berdua? 95m n = 45 110 = 4,5 cm (11991 For hon = 190+9,5cm= 1995cm Tig: Amir= 191,5+92 cm = 198,7cm

Biasakanlah untuk jujur, karena kejujuran itu menuntun kita pada kebaikan. Dan kebaikan itu menuntun kita pada keselamatan.

Nama

Kelompok Belajar : Sumber sulto

No. Absen Kategori Soal : 14. : Post-Test

### A. Isilah titik-titik berikut ini dengan benar!

- 1. 500 hg = ... kg 500:10=50 19
- 2. 1000 dg = ... g 1000:10=100 910m
- 3. 30 kg = ... dag 30 X 100 = 3.000
- 4. 3600 g = ... mg 3.600 x1000 = 3,600,000
- 5. 3,5 g-16 cg + 100 mg = ... cg(3,5 × 100)-16 cg +(100!10)=350-16+16=31f cg
  6. 60 kg + 700 g-120 dag = ... hg (60×100)+(700×100)-(120×10)=60000+7-12=5995h
- 7. 6 hg 12 g + 2000 mg = ... dg 6.000-120+20= 59cc

### B. Kerjakanlah soal cerita dibawah ini!

Aini dan Zahira akan membuat kue. Aini memiliki terigu lebih banyak 6500 gram dari punya Zahira. Sedangkan terigu Zahira ada sebanyak 4 kg. Berapa kg terigu Aini dan Zahira jika digabungkan?

6500=6500:1000 = 6,5 kg Tergo Zohira = 9kg

2. Hasil panen padi milik ayah yang sudah berupa beras terkumpul 5 kwintal. Sebanyal: 255 kg beras dijual. Kemudian untuk persediaa., ayah membeli lagi 220 kg lebih sedikit dari sisa beras yang dijual ayah. Berapa kg beras ayah yang terkumpul sekarang?

5 Kwintal = 5 x 10 = 500 kg Sec- 255 = 245 kg

3. Rasya memiliki buah-buahan segar. Jika satu buah plastik hanya muat untuk membungkus 5 kg jeruk. Dan satu buah plastik lagi hanya muat untuk membungkus 3 kg apel. Maka berapa plastik yang dibutuhkan Rasya untuk membungkus 15.000 gram jeruk dan 18.000 gram apel?

15.000 gram : 15 ece : 1660 = 15/19 15/19 = 3 Plostik

Biasakanlah untuk jujur, karena kejujuran itu menuntun kita pada kebaikan. 🕏 Dan kebaikan itu menuntun kita pada keselamatan.

Nama Kelompok Belajar

No.Absen Kategori Soal

: Post-Test

### A. Isilah titik-titik berikut ini dengan benar!

- 1. 500 hg = 50 kg
- 2. 1000 dg 100g
- 3. 30 kg 3:00 dag 4. 3600 g 600 000 mg
- 5. 3.5 g 16 cg + 100 mg = 0. cg
- 6. 60 kg + 700 g 120 dag 599. hg
- 7. 6 hg 12 g + 2000 mg  $\frac{5.900}{\text{dg}}$

### B. Kerjakanlah soal cerita dibawah ini!

	Aini dan Zahira akan membuat kue. Aini memiliki terigu lebih banyak 6500 gram dari				
	punya Zahira. Sedangkan terigu Zahira ada sebanyak 4 kg. Berapa kg terigu Aini dan				
	Zahira jika digabungkan?				

4Kg + 4Kg+ 6500 gram =8Kg+6.5Kg=14,5Kg

2. Hasil panen padi milik ayah yang sudah berupa beras terkumpul 5 kwintal. Sebanyak 255 kg beras dijual. Kemudian untuk persediaan, ayah membeli lagi 220 kg lebih sedikit dari sisa beras yang dijual ayah. Berapa kg beras ayah yang terkumpul sekarang?

Rasya memiliki buah-buahan segar. Jika satu buah plastik hanya muat untuk membungkus 5 kg jeruk. Dan satu buah plastik lagi hanya muat u. tuk membungkus 3 kg apel. Maka berapa plastik yang dibutuhkan Rasya untuk membungkus 15.000 gram jeruk dan 18.000 gram apel? 33,000



Nama Kelompok Belajar

Yuda Putra · sumber kembar

No.Absen Kategori Soal : | <del>?</del> : Post-Test

### A. Isilah titik-titik berikut ini dengan benar!

- 1. 4 km = .... dam 4x100 = 400
- 2. 11 dm = ... mm 1 100 =1.100
- 3. 36 m = ... km36 :1.0000000036
- 4. 22 hm = ... m 22X100 22.200
- 5. 2,5 m 16 cm + 80 mm = ... cm (2,5 x100) (16cm) + (80:10) = 250 16+8 = 242
- 6. 40 hm + 2 km 400 m = ... dm (40x1.000) + (2km x10.000) (400x10) = 4.000+20.

300m+50km-120 dam= = (200m 100) + (50×10) - (120:10) = 7+500-12=495

> Seorang pemborong mendapatkan pekerjaan pengaspalan jalan separ jang 15 km. Minggu pertama berhasil menyelesaikan 36 dam. Minggu kedua 5.436 m. Berapa meter Panjang pengaspalan jalan yang belum diselesaikan? 15.000-360+57436=15.000-5796

> 2. Aisyah jalan kaki ke masjid untuk menunaikan sholat ied bersama keluarganya. Jarak

rumah Aisyah ke masjid 1450 m. Aisyah bersama keluarganya sudah berjalan sejauh 850 dm. Berapa meter lagi Aisyah bersama keluarganya sampai masjid?

1450-850 dm

Farhan dan Amir berniat untuk mengikuti lomba renang antar sekolah. Syarat untuk menjadi peserta lomba harus memiliki tinggi minimal 140 cm. Tinggi badan Farhan 45 mm lebih tinggi dari batas minimal syarat perlombaan. Sedangkan tinggi badan Amir 4,2 cm lebih tinggi dari tinggi badan Farhan. Berapa cm selisih tinggi badan mereka berdua?

45 mm +140 cm 4,5 + 140 UN = 144,5 (n)

Biasakanlah untuk jujur, karena kejujuran itu menuntun kita pada kebaikan. Dan kebaikan itu menuntun kita pada keselamatan.

## APPENDIX 12 TEACHER INTERVIEW SHEET

### LEMBAR WAWANCARA GURU KELAS IV SDN SUMBERKEMBAR MOJOKERTO

- 1. Sudah berapa lama Bapak/ibu mengajar matematika di kelas IV?
- 2. Berapa jumlah kelas Bapak/Ibu ajar?
- 3. Dalam satu minggu ada berapa kali pertemuan untuk mengajar pelajaran matematika?
- 4. Ketika dalam mengajar, metode-metode apa sajakah yang Bapak/Ibu gunakan?
- 5. Media apa saja yang Bapak/Ibu pakai dalam proses pembelajaran matematika di kelas IV?
- 6. Kendala apa yang Bapak/Ibu berikan untuk menyelesaikan masalah kendalakendala tersebut?
- 7. Bagaimana solusi yang Bapak/Ibu berikan untuk menyelesaikan masalah kendala-kendala tersebut?
- 8. Bagaimana respon anak-anak ketika Bapak/Ibu menjelaskan pelajaran di dalam kelas?
- 9. Bagaimana nilai matematika siswa kelas IV?
- 10. Berdasarkan apa Bapak/Ibu membagi siswa untuk belajar ke sekolah di masa pandemi covid-19 saat ini?

## APPENDIX 13 TABLE OF T-TEST RESULTS USING SPSS

**Group Statistics** 

Croup Statistics						
			М	Std.	Std.	
	Kelas	N	ean	Deviation	Error Mean	
Hasil Belajar Matematika	KELAS A	10	85.5000	7.24569	2.29129	
	KELAS B	10	72.5000	7.16860	2.26691	

**Independent Samples Test** Levene's Test for Equality of Variances t-test for Equality of Means 95% Confidence Std. Interval of the Sig. Mean Error Difference (2-Differenc Differen F Sig. t Df tailed) Lower Upper e ce Learning Equal .055 .817 18 13.00000 19.77165 outcomes variances 4,033 .001 3.22318 6.22835 Mathematics assumed Equal .001 6.22829 17,998 13.00000 3.22318 19.77171 variances not 4,033 assumed

## APPENDIX 14 DOCUMENTATION OF ACTIVITY



Foto Kelompok Eksperimen mengerjakan soal Pre Test



Foto Kelompok Eksperimen mengerjakan soal Pre Test



Foto Kelompok Kontrol mengerjakan soal Post Test



Foto Kelompok Eksperimen Menggunakan Media Popscra Book



Foto Guru Menggunakan Media Popscra Book

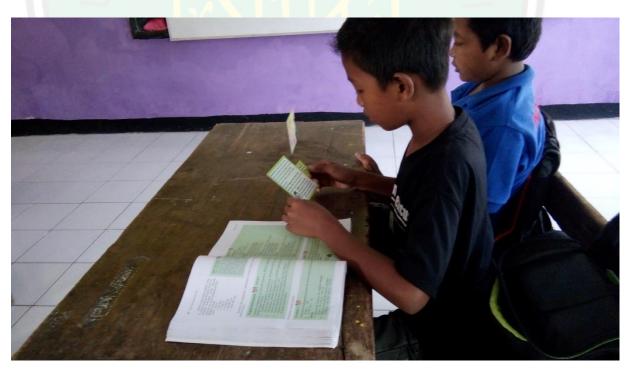


Foto Siswa Memahami Materi Menggunakan Media Popscra Book

### APPENDIX 16 CURRICULUME VITAE

### **BIOGRAPHY**



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Mojokerto, September 9<sup>th</sup> 2020

Mahasiswa,

Vivy Endang Try Santi

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