DEVELOPMENT OF THE *"LITTLE SCIENTIST"* GUIDEBOOK IN STEAM LEARNING TO IMPROVE SCIENCE LITERACY SKILLS IN 4-5-YEAR-OLD CHILDREN

UNDERGRADUATE THESIS

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UNIVERSITAS NEGERI SURABAYA
FACULTY OF EDUCATION
EARLY CHILDHOOD EDUCATION STUDY PROGRAMME
2023

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Submitted to the State University of Surabaya to fulfill the requirements for the completion of the Bachelor's Program

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APPROVAL PAGE

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This thesis has been approved and declared eligible to be presented in the thesis examination.

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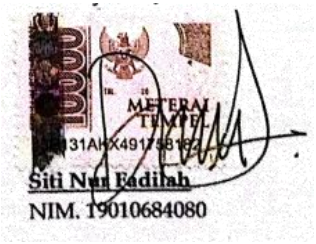
Hereby declares truthfully that:

1. The thesis being examined is genuinely the result of my own work (not based on fake data and/or plagiarism/copying or self-plagiarism).
2. If it is proven in the future that my statement is untrue, I am willing to bear the consequences and be legally prosecuted in accordance with applicable regulations.

This is the statement letter that I have made truthfully.

Surabaya, June 16 2023



DEDICATION PAGE

Alhamdulillah, all praise be to Allah SWT. We praise and seek assistance, forgiveness, and guidance from Him. We seek refuge in Allah from the evils within ourselves and the wrongs of our deeds. The author expresses gratitude for the presence of Allah SWT, who has bestowed His mercy and guidance, enabling the completion of the thesis titled *"Development of the 'Little Scientist' Guidebook in STEAM Learning to Improve Science Literacy Skills in 4-5-Year-Old Children."*

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MOTTO

"There is neither too early nor too late; everything unfolds according to the destined time and divine plan"

The key is to involve Allah in every matter, no matter what.

FOREWORD

Praise and Gratitude to Allah SWT for His presence, blessings, mercy, and grace, which have provided the strength and ability to complete this thesis entitled "Development of the 'Little Scientist' Guidebook in STEAM Learning to Improve Science Literacy Skills in 4-5-Year-Old Children." This thesis aims to determine the improvement of science literacy skills in children aged 4-5 years using the "Little Scientist" guidebook as a teaching aid. The guidebook is intended to assist teachers in developing children's science literacy skills according to their developmental stages. May blessings and greetings be upon the Prophet Muhammad SAW. This thesis is prepared to fulfill one of the requirements for obtaining a Bachelor's degree in Education (S.Pd) in the Early Childhood Education Teacher Education Program, Faculty of Education, State University of Surabaya.

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ABSTRACT

DEVELOPMENT OF THE *"LITTLE SCIENTIST"* GUIDEBOOK IN STEAM LEARNING TO IMPROVE SCIENCE LITERACY SKILLS IN 4-5 YEAR-OLD CHILDREN

Name : Siti Nur Fadilah
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It is important for children's cognitive abilities and scientific literacy to be optimized and stimulated with the right methods. The goal to be achieved in this research is to develop a little scientist guidebook in STEAM learning to improve the scientific literacy skills of children aged 4-5 years and find out the validity, practicality and effectiveness of the guidebook. This research uses Research and Development (R&D) or research and development (R&D) research using the ADDIE Analyze, Design, Development, Implementation, and Evaluation model. The data in the form of an assessment of the validity, practicality and effectiveness of the little scientist's handbook was obtained by means of questionnaires or questionnaires and field trials.

The results of the data obtained from the validity trial from material experts showed a percentage value of 97.72% and the percentage obtained from media experts was 98.52% so that it was included in the very good category. As for the practicality assessment of the little scientist 's guidebook using the ngain score, the average n gain score obtained is 0.73 which is in the criterion g> 0.7. This shows that the Little scientist guidebook has high practicality so that the Little scientist guidebook is suitable for use as a learning resource for teachers in teaching children's science literacy. In addition, an assessment was carried out to test the effectiveness using the Wilcoxon test to obtain an Asymp Sing (2-tailed) result of 0.000 so that $P < 0.05$ or $0.000 < 0.05$, so H_0 was

rejected and H1 was accepted. So it can be concluded that there is the influence of the little scientist 's guidebook to improve the scientific literacy skills of children aged 4-5 years. Based on these results, it can be concluded that the Little scientist 's Handbook is stated to meet the standards of validity, practicality, and effectiveness in stimulating children's scientific literacy skills at the age of 4-5 years. The development of a little scientist guidebook can be an innovative teaching material for kindergarten teachers in order to stimulate children's scientific literacy skills.

Keywords: *Quidebook, Children's Science Literacy, STEAM Learning*

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CHAPTER I

INTRODUCTION

A. Background

In the era of globalization, optimizing the cognitive development and scientific literacy of children plays a crucial role in a nation's progress. To succeed in the 21st-century development of Indonesia, society needs to learn and master six basic literacies, including reading and writing literacy, numeracy literacy, language literacy, digital literacy, science literacy, and cultural and civic literacy (Miftahul, 2020). Literacy is defined as the ability to interpret critical information so that individuals can access knowledge and technology to improve their quality of life (Widayanti, Komalasari, and Fitri, 2023).

One of the crucial basic literacies for early childhood is science literacy. Science literacy involves knowledge of science and the ability to identify questions, acquire new information, explain scientific phenomena, draw conclusions based on facts, understand the characteristics of science, awareness of the impact of science and technology on the natural, intellectual, and cultural environment, and a desire to engage with and care about issues related to science (Wahyuningsih, 2021). According to the National Research Council (NRC), science literacy is *"the capacity to use scientific knowledge to identify questions and draw evidence-based conclusions to understand and make decisions about the natural world and changes made to it through human activity"* (Shaffer, Ferguson, and Denaro, 2019).

Based on these definitions, science literacy can be described as an individual's ability to apply scientific knowledge and skills in understanding and making decisions related to the natural environment. One comprehensive study assessing international achievements in science literacy is the Program for International Student Assessment (PISA). The results of the 2018 PISA study showed that the level of science literacy among Indonesian children is still low, with Indonesia ranking 72nd out of 77 OECD countries in 2019 (Adriyawati et al., 2020). The weakness in the

science literacy skills of Indonesian children is influenced by their difficulty in aligning learning with everyday life.

The lack of attention to science literacy in Indonesia is related to the insufficient understanding of teachers about the importance of science literacy in education. Several factors contributing to the low science literacy skills of children include inappropriate textbook selection, misconceptions, less contextualized learning, lack of reading abilities, and unsupportive learning environments (Fuadi et al., 2020). Developing science literacy skills has become an urgent need in today's education system to enable children to make effective decisions using acquired knowledge and apply learned concepts to solve everyday problems (National Research Council, 2012, in Adriyawati et al., 2020).

Transforming daily activities into scientific endeavors is more than just enjoyable; it is crucial for the child's future. Providing opportunities for children to learn scientific concepts and hear answers to their questions or ideas from people around them enables children to ask and answer their own questions. Building perseverance and enhancing problem-solving and self-regulation skills are crucial factors for academic success (Randy, 2019). Science learning for young children involves mastering facts or environmental phenomena and applying this information in everyday life (Zahro, Atika, and Westhisi, 2019).

The application of science literacy concepts is part of implementing science content. The importance of science literacy in education serves as a means to evaluate science material components, including knowledge of science content, understanding of science as a tool for knowing and understanding, and the ability to implement scientific inquiry (Britton & Schneider, in Widayati, Safrina, and Supriyati, 2020). A child's science abilities can be measured by observing their application of science literacy, which can be seen through their speaking, writing, and attitudes when engaged in science learning activities at school.

The demand for soft skills related to the new curriculum in science, technology, engineering, and mathematics (STEM) has changed and requires extensive knowledge and a background with skills involving not only technical aspects but also art. Therefore, education professionals have developed the STEAM (Science,

Technology, Engineering, Art, and Mathematics) approach to meet these demands (University of Central Florida, 2023). STEAM learning is a proven effective learning program. Many researchers have recommended the use of STEAM learning methods (Munawar, Roshayanti, and Sugiyanti, 2019; Putri and Taqiudin, 2021; Sumarno et al., 2021). Implementing STEAM learning through science literacy is crucial to be applied to children to enhance their abilities in facing various challenges in the 21st century.

Through the STEAM method, children can be encouraged to explore their abilities, create innovative works, collaborate, work together, and take personal and interpersonal responsibility (Haifaturrahmah in Twiningsih and Elisanti, 2021). From this explanation, it is undoubtedly relevant to 21st-century skills, making STEAM essential to be applied in the learning system.

Learning through play can make children feel more enjoyable as playing is a way for children to learn. Science games have benefits for young children as they can create joy and encourage children to imagine, naturally enhancing their knowledge (Nelsen et al., 2021). Introducing science to children at an early age can stimulate critical and creative thinking. Through science games, children can learn to solve problems on their own or deal with challenges using their abilities.

The researcher conducted preliminary observations to assess the science literacy skills of young children. Based on the observations at TK Aisyiyah Bustanul Athfal 57 Surabaya, it was found that the learning model used was the center-based learning, and science learning was conducted in the natural materials center. During science learning, the teacher still used Lesson Plan (LKA), and the learning was not fully STEAM-oriented. The teacher explained how to complete science activities, such as coloring with chicken feathers during the theme of chickens. However, the children only observed the teacher explaining how to complete the activity. This lack of interaction, in the form of questions and answers between the teacher and the children, hindered the children's science literacy skills. The lack of interaction resulted from the absence of a STEAM-oriented science literacy guidebook, leading to the class's reliance on LKA. Therefore, the researcher created a guidebook to assist teachers in implementing science

literacy with a STEAM approach.

This research aims to produce and assess the feasibility of a product, namely a guidebook for teachers related to science literacy for young children. The book contains science games in the form of experiments with a STEAM approach to cultivate science literacy in young children. Early childhood is the best age to provide appropriate stimulation in the education process so that children can develop rapidly. Children are considered capable of learning science because they are naturally curious about their world, always asking questions, and exploring new things around them. Developing science skills from an early age provides a foundation for a child's academic skills, abilities, and attitudes in science and other fields in the future (Qonita, 2018).

According to Ruyattman and Afandi (in Aisyah, 2022), a guidebook is a book that contains practical instructions, components, or rules for carrying out something or a specific field. The function of a guidebook is to assist teachers, providing an understanding of the curriculum that can be used as a reference during the teaching process. In line with the statement above, the guidebook for the literacy science learning program for young children serves as a tool for teachers to conduct literacy science learning through a structured and systematic program.

This study focuses on efforts to cultivate science literacy in young children. Applying science literacy in early childhood education can help develop children's thinking, including responsibility for themselves and their environment. The implementation of science literacy in early childhood education is expected to build and develop the science literacy skills of early childhood educators. They should be able to implement science literacy in child-oriented learning to understand and apply scientific concepts using concrete media and provide an understanding of science to young children (Zahro et al., 2019).

Considering these challenges, teachers need a guidebook for science literacy development, while children need appropriate stimulation. Therefore, this research was conducted to produce a science literacy guidebook titled *"Development of the Little Scientist Guidebook in STEAM Learning to Improve Science Literacy Skills in 4-5-Year-Old Children."*

B. Problem Formulation

Based on the existing problem background, that there is no science learning guidebook with a STEAM approach to improve the science literacy skills of children, the problem formulation in this research is:

1. How is the validity of the Little Scientist guidebook in STEAM learning to improve the science literacy skills of 4-5-year-old children?
2. How is the effectiveness of the Little Scientist guidebook in STEAM learning to improve the science literacy skills of 4-5-year-old children?

C. Research Objectives

Based on the background description and the problem formulation above, the objectives of this research are:

1. To determine the validity of the Little Scientist guidebook in STEAM learning to improve the science literacy skills of 4-5-year-old children.
2. To determine the effectiveness of the Little Scientist guidebook in STEAM learning to improve the science literacy skills of 4-5-year-old children.

D. Research Benefits

1. Theoretical
   Assist teachers in developing children's science literacy skills using the Little Scientist guidebook in STEAM learning.
2. Practical

a. For Schools:
   The development of the guidebook is expected to provide information for the development of learning media and resources.

b. For Teachers:
   Teachers can utilize the developed guidebook for the learning process.

c. For Children:
   Facilitate children in understanding science literacy.

d. For Researchers:

1) Provide recommendations for applying knowledge acquired during college to develop learning media to address learning problems.
2) Gain experience in developing learning media beneficial in the academic world.

E. Product Specifications

The product specifications developed in the research titled *"Development of the Little Scientist Guidebook in STEAM Learning to Improve Science Literacy Skills in 4-5-Year-Old Children"* are as follows:

Table 1.1
Product Specifications of "Little Scientist" Guidebook

No	Type	Specification
1.	Printed Media	a. Media Form Book b. Size The guidebook is sized 23cm x 22.5cm. c. Material The cover uses a hardcover, and the content is printed on art paper with a thickness of 210gsm. d. Cover Image The cover features the title "Little Scientist" along with an image of a child scientist.
2.	Contents Aspect of the Printed Media	a. Title Page b. Table of Contents: Facilitates finding desired science experiments for children. c. Science Literacy and Its Teaching d. Definition of science literacy and the achievement of science literacy for 4-5-year-old children.

No	Type	Specification
		e. Steps in Teaching Science Literacy f. Includes a page for assessing children's science literacy. g. Learning Materials 1) The guidebook contains 9 science experiment activities consisting of 3 science concepts for young children, including: 1. Physical Science (Walking Color Water, Magnet Car, Spinning Ice). 2. Life Science (Planting Water Spinach, Colorful Rose Flower, Blooming Flower). 3. Earth and Space Science (Process of Rain Occurrence, Volcanic Eruption, Rainbow in a Glass). 2) Each experiment activity is equipped with tools and materials, as well as steps to conduct the experiment. 3) Each experiment includes an assessment of science literacy and a Lesson Plan (LKA) for children with a theme corresponding to the experiment.

F. Assumption

The assumptions in this research are as follows:

1. The "Little Scientist" guidebook helps develop the science literacy skills of young children.
2. The "Little Scientist" guidebook helps improve the effectiveness of science literacy learning for young children.

G. Scope and Limitation

This developmental research has the following limitations:

1. The development of the guidebook is limited to mastering science literacy learning for 4-5-year-olds.
2. The development of the guidebook is carried out for children in the A group of TK Aisyiyah Bustanul Athfal Surabaya.

CHAPTER II

REVIEW OF LITERATURE

A. The "Little Scientist" Guidebook in STEAM Learning

1. Guidebook

a. Definition of Guidebook

A book is defined as a collection of graphic communication forms, images, and letters or typography, its content divided into several units to appear systematically so that its content lasts (Usep, Kustiawan 2016). With the help of a book, we understand the thoughts and ideas of an expert. Books are well-organized to endure and serve the purpose of the required field of study.

According to Lange in (Ariana, 2016), books are divided into two types: main books and supplementary or additional books. A book can be used to encourage the development of children's knowledge and skills according to the learning objectives and the child's developmental level. A book is a crucial source of information. The guidebook is an example of a print-based teaching material containing learning materials or information presented on paper as a medium. Print materials are prepared for the purpose of learning or information delivery (Widayanti and Abidin 2020). Through the book, we gain various information needed.

According to Ruyattman and Afandi in (Aisyah, 2022), a guidebook is a book containing practical instructions, components, or rules for carrying out something or a specific field. The function of a guidebook is as a tool for teachers that contains an understanding of the curriculum that can be used as a reference material during the teaching process. If the teaching components in the guidebook run well and maximally, then the learning is considered effective (Atfhal et al. 2022).

According to the statement above, the guidebook for the literacy science learning program for young children can be used as a tool for teachers to conduct literacy science learning through structured and systematic program activities.

Based on the opinions mentioned above, a guidebook can be concluded as a collection of instructions for communication, its content divided into several parts, with the aim of maintaining systematicity and preserving its content for a long time. With the help of this guidebook, which includes steps for conducting experiments, children's science literacy can be developed to enhance children's cognitive abilities in age-appropriate science experiments for use by teachers.

b. Characteristics of a Guidebook

According to Muslich in (Rahma, 2022), a book has two characteristics: general and specific. In general, a book is scientific writing; thus, a textbook is similar to scientific writing in general, and the similarities can be seen in several aspects:

1. Regarding content, the textbook contains various knowledge that can be scientifically justified.
2. In terms of presentation, the material in the book is organized following a specific learning material, using scientific presentation models such as inductive or deductive reasoning or a combination.
3. Regarding format, the book follows the rules of scientific books, such as writing patterns, citations, divisions, and discussions.

A guidebook has specific characteristics that differ from books in general. These specific characteristics are seen in the following aspects:

a) The guidebook is based on the Education Curriculum. The Education Curriculum is directed towards basic foundations, approaches, strategies, and program structures.
b) The guidebook focuses on specific objectives. The

content of the guidebook is directed toward specific goals.

c) The guidebook presents a specific field of study. The guidebook is prepared for a specific field of study. It is not allowed for a guidebook to contain multiple fields of study. The packaging of the guidebook is directed toward a specific class or field of study. This means there is no guidebook suitable for all classes and all fields of study.

d) The guidebook is intended for children's learning activities. The presentation of the guidebook's content should be directed toward children's learning activities. When reading the guidebook, children understand a series of learning activities for the achievement of understanding, skills, and attitudes.

e) The guidebook guides teachers in classroom teaching activities. To facilitate teaching and learning activities, the content of the guidebook should guide teachers in conducting instructional activities in the classroom. The instructional steps in the guidebook should guide teachers in determining teaching steps in the classroom.

f) The presentation pattern of the guidebook is adjusted to the intellectual development of the target children. The presentation pattern is suitable if it meets criteria based on children's knowledge and experiences, their needs, thought patterns, possible response abilities, language abilities, and if it can stimulate children's curiosity during the learning process.

Based on the opinions above, it can be concluded that the characteristics of a guidebook are systematically organized, referring to the curriculum and learning objectives. The "Little Scientist" guidebook is oriented toward children's learning activities, both for achieving the goals of understanding a child. The "Little Scientist" guidebook is used effectively and beneficially and has

standards in terms of presentation patterns and language style.

c. Feasibility of a Guidebook

The feasibility of a guidebook must be conducted to determine whether the guidebook being developed is suitable for its goals and target audience. The criteria for a guidebook's quality according to Walker & Hess in (Sya'banah, 2019) are:

1) Quality of content and objectives
   a) Accuracy
      Before designing a guidebook, it is essential to understand how the content of the "Little Scientist" guidebook aligns with the learning objectives.
   b) Importance
      The importance of the guidebook's content must be prepared from the beginning. The materials included in the guidebook must be needed and essential to be included in the book.
   c) Completeness
      The completeness of the material presented in the guidebook must be comprehensive and sequential. Completeness is crucial to avoid confusion among readers, and the material must be conveyed well.
   d) Balance
      In the guidebook, images and text must be balanced so that readers can easily understand the presented material. The balance between images and text can create interest for the reader.
   e) Interest or attention
      The guidebook must be appealing. The more attractive the guidebook, the more people want to read it.

2) Instructional Quality
    a) Providing learning opportunities: The guidebook should provide maximum learning opportunities for children.
    b) Providing learning assistance: The guidebook can assist teachers when they are confused about finding science materials during teaching.
    c) Motivational quality: It can motivate learning by using the "Little Scientist" guidebook in STEAM during science lessons.
    d) Instructional flexibility: The practicality of learning conveyed using the "Little Scientist" guidebook in STEAM.
    e) Quality of instructional social interaction: The guidebook's content is connected to relevant learning.
    f) Impact on children and learners: It can have a positive influence on children and learning when using the guidebook.
    g) Impact on teachers and learners: It can have a positive impact on teachers and learners when using the guidebook.

3) Principles of Media Selection
    a) Readability: In the guidebook, the clarity of writing and font must be evident.
    b) Ease of use: The guidebook should be easy to use during teaching.
    c) Quality of display: The guidebook's media size should be suitable.
    d) Quality of program management: How to use the guidebook.

Based on the opinions above, it can be concluded that to meet the standards of guidebook feasibility, it can be assessed based on guidebook criteria and provisions. To meet the criteria for a viable guidebook, there are several criteria, including the quality of content and

objectives, the ability to provide learning assistance, and the ability to have a positive impact on children. A viable guidebook can help educators deliver learning materials effectively.

2. Science Learning

a. Definition of Science Learning

Early childhood science is an investigative activity in line with constructivist and inquiry principles (Umboh et al., 2022). Science for young children involves activities such as observation, classification, and prediction of natural events, following the principles of constructivism and inquiry. An effective learning program for children should be adapted to the needs and characteristics of children (Maulidiyah, 2017). Therefore, science learning for young children should be enjoyable.

Science, as knowledge obtained through observation and experimentation, helps in understanding nature and the scientific phenomena occurring in nature. According to Ellysa and Muhammad (2021), science generally covers three fields:

1) Physical Science: Relating to inanimate objects, including their characteristics, influencing energy, and possible changes. For early childhood learning, various physical science concepts are introduced, such as material properties (color, shape, texture, size, magnetism, gravity, density, light, weight, balance, shape changes, force, motion, and speed).
2) Life Science: Relating to living organisms, such as humans, animals, and plants. Concepts introduced in early childhood education include the recognition of body parts, their functions, how to use body parts, life cycles, and understanding the relationship between living things and their environment.
3) Earth and Space Science: Earth Science covers aspects such as water, air, rocks, soil, and natural

disasters. Meanwhile, space science relates to objects beyond Earth, such as the moon, stars, and the sun, as well as their effects, like weather, day and night, seasonal changes, and temperature differences.

Based on the opinions above, it can be concluded that science learning for young children is an investigative learning activity with constructivist and inquiry principles that involve children in observing, classifying, and predicting natural events through enjoyable science play to enhance the effectiveness of the learning process for children.

b. Constructivism and Inquiry in Science Learning

Constructivism theory in learning sees that children can build their knowledge through their learning experiences (Umboh et al., 2022). Constructivist learning theory involves achieving and controlling concepts in children directed by the meaningfulness of the learning activities they undergo. The application of constructivist learning theory is student-centered, emphasizing collaborative group or class activities and presenting contextual issues based on children's experiences to support the success of the expected learning objectives (Suci, 2019).

Constructivism theory, according to Piaget, emphasizes how individuals create meaning based on the interaction between their experiences and ideas (Suryana, Aprina, and Harto, 2022). Regarding constructivism-based learning activities, inquiry is one of the relevant methods to constructivism principles because this method provides opportunities for children to independently build concepts based on their learning experiences.

Inquiry is a method derived from the investigative approach where children are given the opportunity to investigate a problem, identify possible solutions, make observations, ask questions, test ideas and concepts, and

build creative thinking by training the child's intuition (Umboh et al., 2022). The inquiry at certain education levels fundamentally seeks to increase children's attention so that they are willing to investigate specific topics critically through hands-on activities, either independently or guided, involving more concrete objects, especially for children. Children tend to remember something they can see and touch more easily than something explained verbally, as sensory experiences and memories formed in the brain are stronger and more acceptable (Widayanti, 2016).

Inquiry activities guide children to describe objects or events, ask questions, build explanations, test these explanations according to specific scientific knowledge, and communicate them to others. Through learning activities as described above, children actively develop an understanding of science by combining scientific knowledge with thinking skills and reasoning. In this context, a teacher needs to find, discover, and choose media that suit the needs of children's learning, can increase learning motivation, match the developmental level and experiences, and consider the specific characteristics of the group of children who are learning (Nabilah and Tibyani, 2021).

The characteristics of inquiry-based science learning above describe the principles of constructivism learning theory. Children play a dominant role in developing concepts, while teachers are facilitators who need to provide specific learning assistance so that students can achieve their learning goals. By conducting science experiments from an early age, children will be able to solve their own problems or everyday problems faced by children (Mayasari and Fitri, 2022).

Based on the opinions above, it can be concluded that the constructivism theory is about how children create meaning based on their experiences and ideas. Inquiry is one of the methods relevant to constructivism principles because this method provides opportunities

for children to independently build concepts based on their learning experiences.

c. Science for Early Childhood

Early childhood is characterized by a unique curiosity about the surrounding environment. Adults can leverage this curiosity to help children seek information and answer their own questions. In science education, this can facilitate teachers in directing children towards investigative or exploratory activities based on the principles of constructivism and inquiry. Science for young children involves not just a collection of facts but activities such as observing, classifying or organizing information, predicting what will happen, testing predictions through guided activities, and formulating conclusions (Suci, 2019).

Science activities for children should be enjoyable and fascinating, involving things that children find interesting and consider engaging to provide new knowledge or stimulate children to explore and investigate. Children tend to get bored with the learning process, while they are more interested in playing (Saroinsong, Imara, Simatupang 2021). Science learning is made enjoyable for children by conducting experiments, making learning more enjoyable, and preventing boredom during the learning process. Science, for children, involves gaining knowledge through observation, experimentation, and various natural science disciplines (Irmaningtyas in Mayasari and Fitri, 2022).

In conclusion, science learning for young children needs to start by posing various questions that can stimulate varied answers from children. This is possible when the questions asked are in line with real-life contexts experienced by children or related to real objects easily observed by children. The questions asked serve as the starting point for teachers to guide children to the next stage, which is observation or simple

experiments. At this stage, the teacher acts as a facilitator, guiding children in recording data or facts obtained during observation or experimentation. The process of drawing conclusions in early childhood can be assisted by teachers through posing follow-up questions that help children understand the observed objects or events. Science learning activities are based on the principles of constructivism and inquiry in developing scientific behavior for young children. Science equips children to work as scientists by training them to respond to nature by solving simple problems, explaining events, explaining how to obtain something, and working according to the problems they face.

d. STEAM for 4-5 Year-Olds

The STEAM approach stands for Science, Technology, Engineering, Art, and Mathematics. STEAM is a learning approach that encourages children to think more broadly about science, technology, engineering, art, and mathematics for everyday life, presented in a series of fun, meaningful, and inspiring learning activities (Novitasari, 2022). Through the STEAM approach, teachers can design and implement project-based learning involving the five disciplines, creating a meaningful learning environment that provides opportunities for children to engage and participate directly (Damayanti in Hasibuan, Fitri, and Dewi, 2022).

STEAM refers to an individual's knowledge, attitudes, and skills to identify questions and problems in real life, explain natural and designed phenomena, and describe fact-based conclusions about STEAM issues (Wahyuningsih et al., 2019). To introduce the concept of STEAM to young children, a safe and enjoyable learning environment can be created that allows children to explore, discover, build, conduct experiments, predict, search for temporary answers, and connect knowledge with everyday life. The key activities in implementing STEAM can be carried out through play to make children feel comfortable and enthusiastic about participating.

The implementation of STEAM in early childhood involves several aspects that need attention, namely: asking questions, exploring and observing, developing skills and processes, communicating, and playing (Suci Utami, 2019). Activities that can be carried out for each aspect in early childhood include:

1) Questioning: Asking questions about objects or events around children.
2) Exploring and observing: Actively exploring through observation using the senses.
3) Developing skills and processes: Building, creating, and designing using various materials and techniques, using numbers, making measurements, identifying and trying possible solutions to a problem, collecting, comparing, sorting, grouping, interpreting, and describing the results of observations.
4) Communicating: Developing language skills and communicating with others, working individually or in groups, and sharing and discussing ideas through talking, listening, and writing.
5) Playing: Learning takes place by applying play principles.

Teachers can use these aspects as a reference in designing the framework for STEAM-based science learning activities for young children. Elements in STEM do not have to be done sequentially; the most important thing is to involve these elements in a series of learning activities.

From the statements above, it can be concluded that STEAM is an approach that can train children to think critically and develop thinking skills, encompassing STEAM-based learning (Science, Technology, Engineering, Art, and Mathematics). Aspects to be considered in STEAM learning are: asking questions, exploring and observing, developing skills and processes, communicating, and playing.

e. Components of STEAM in Early Childhood

The components of STEAM (Science, Technology, Engineering, Art, and Mathematics) for early childhood (Novitasari, 2022) are as follows:

1) Science: Children naturally have the ability to be scientists. They follow a series of steps called the scientific method to understand how the world around them works. This method includes observation, asking questions, making predictions, designing and conducting experiments, and discussing.
2) Technology: Technology includes all kinds of objects created by humans, such as simple tools like pulleys, wheels, levers, scissors, and inclined planes, all falling under the technology category. Through the use of technology in simple experiments, children can develop an early understanding of technology concepts and an introduction to tools. Technology in the STEAM approach for early childhood provides an opportunity for children to build an understanding of the role of technology in everyday life.
3) Engineering: Engineering involves applying sciences such as science, mathematics, and technology to solve problems. Engineering involves using various types of materials that are then designed, processed, and built to understand how and why something works. When children use blocks to design and build, or combine toy train tracks, they play the role of engineers.
4) Art :Creative thinking skills are crucial, especially for children who need to innovate and find creative solutions to problems. Creativity can be developed through activities such as painting, role-playing, music, and drawing. Art is a way to explore things sensorily. When children paint, they can feel the texture and see the beautiful colors on the paper. Children can also use symbols in their art to

represent real objects, events, or feelings. Drawing and role-playing provide opportunities for children to express what they know and feel.

5) Mathematics: Mathematics includes numbers and operations, measurement, patterns, geometry, and spatial abilities. From birth to the age of five, children explore mathematical concepts in their daily lives. They acquire informal knowledge about "more" and "less," shapes, sizes, ordering, volume, and distance.

3. "Little Scientist" STEAM Learning Guide Book

The "Little Scientist" guidebook is designed for teachers and customized in length and width according to the learning objectives. The "Little Scientist" guidebook can be used to develop children's scientific literacy skills. It includes several experiments with steps for conducting simple experiments for young children. The guidebook aims to develop children's cognitive abilities, such as expressing their thoughts and logical reasoning, by engaging in playful scientific experiments. Fun learning activities can help enhance the effectiveness of the learning process for children (Fatma and Maulidiyah, 2019).

Guidebooks play a crucial role for both teachers and children. Teachers can use guidebooks as a structured and systematic guide to delivering material, ensuring effective and efficient learning. With guidebooks, the delivery and learning processes are expected to be better and more effective (Nimah, 2020). The "Little Scientist" guidebook stimulates children to develop literacy skills and cognitive abilities by creating simple experiments with the aim of understanding the scientific processes that occur during experiments. If children's scientific literacy potential is well developed, they will experience good development and growth (Aulia et al., 2022).

The "Little Scientist" guidebook in this research aims to create simple experiments tailored to the age of children, categorized into three activities: physical science (colorful

water movement, dancing dolls, and making spinning ice), life science (planting water spinach, colorful rose flowers, and blooming flowers), and earth and space science (rain process, volcano eruption, rainbow in a glass).

Inside the "Little Scientist" guidebook, there are STEAM learning activities, including:

1) Colorful Water Movement
    a) Science: Science in the colorful water movement activity involves color mixing.
    b) Technology: Technology in the colorful water movement activity involves the use of tools such as a pipette used to pour color into a glass during the colorful water movement activity.
    c) Engineering: Engineering in the colorful water movement activity involves how children conduct the colorful water movement experiment.
    d) Art: Art in the colorful water movement activity involves children recognizing various colors.
    e) Mathematics: Mathematics in the colorful water activity involves children learning about more and less volume of water to be poured into glasses.

2) Magnet Car
    a) Science: Introduction to simple concepts on magnets.
    b) Technology: Technology in the magnet car activity involves the use of tools such as scissors needed to make a magnet car.
    c) Engineering: Engineering in the magnet car activity involves the process when children make a magnet car.
    d) Art: Art in the magnet car activity involves recognizing various colors on the toy car.
    e) Mathematics: Mathematics in the magnet car activity involves children counting the number

of magnets.

3) Making Spinning Ice
   a) Science: Science in the making of spinning ice involves children learning about the transformation of the shape of an object.
   b) Technology: Technology in the making of spinning ice involves the use of tools such as a spoon to scoop the materials used during the spinning ice experiment.
   c) Engineering: Engineering in the making of spinning ice involves the process when children make spinning ice.
   d) Art: Art in the making of spinning ice involves decorating spinning ice with toppings.
   e) Mathematics: Mathematics in the making of spinning ice involves activities such as counting the amount of ice to be made.

4) Planting Water Spinach
   a) Science: Science in planting water spinach involves observing the water spinach growing process.
   b) Technology: Technology in planting water spinach involves the use of tools such as a shovel used during the water spinach planting activity.
   c) Engineering: Engineering in planting water spinach involves the process of children planting water spinach.
   d) Art: Art in planting water spinach involves decorating the pot used for planting water spinach.
   e) Mathematics: Mathematics in planting water spinach involves knowing the amount of soil to be put into the pot for planting water spinach.

5) Colorful Rose Flowers

a) Science: Science in the colorful rose flowers activity involves the process of color transfer to rose flowers.
b) Technology: Technology in the colorful rose flowers activity involves the use of tools such as a pipette used to make colorful flowers.
c) Engineering: Engineering in the colorful rose flowers activity involves the process when children engage in the colorful rose flower activity.
d) Art: Art in the colorful rose flowers activity involves the introduction to colors.
e) Mathematics: Mathematics in the colorful rose flowers activity involves counting the number of roses used for the colorful rose experiment.

6) Blooming Flowers
   a) Science: Science in the blooming flowers activity involves folded paper flowers blooming when placed in water.
   b) Technology: Technology in the blooming flowers activity involves the use of tools such as scissors used during the blooming flower experiment.
   c) Engineering: Engineering in the blooming flowers activity involves the process when children make blooming flowers.
   d) Art: Art in the blooming flowers activity involves folding flowers.
   e) Mathematics: Mathematics in the blooming flowers activity involves counting the number of blooming flowers used.

7) Rain Process
   a) Science: Science in the rain process activity involves children understanding the process of rainfall.
   b) Technology: Technology in the rain process

activity involves the use of tools to be used during the experiment of the rain process.

c) Engineering: Engineering in the rain process activity involves the process when children engage in the rain process activity.
d) Art: Art in the rain process activity involves the introduction to colors.
e) Mathematics: Mathematics in the rain process activity involves introducing the concept of volume.

8) Volcanic Eruption
   a) Science: In the volcanic eruption activity, the experiment depicting a volcanic eruption illustrates the simple process of a volcano erupting and releasing lava.
   b) Technology: Involves the use of equipment such as spoons and plastic bottles during the volcanic eruption activity.
   c) Engineering: Involves the process where children create and conduct experiments related to volcanic eruptions.
   d) Art: Artistic expression is involved in the making of a miniature volcano during the volcanic eruption activity.
   e) Mathematics: Involves understanding the concepts of less and more for pouring materials into the miniature volcano.

9) Rainbow in a Glass
   a) Science: The science aspect of the rainbow in a glass activity focuses on the introduction to liquid substances.
   b) Technology: Involves the use of equipment such as spoons during the rainbow in a glass activity.
   c) Engineering: Engineering aspects come into play when children engage in the process of

creating a rainbow in a glass.

d) Art: Involves artistic aspects during the introduction to colors.
e) Mathematics: Mathematics plays a role in understanding water volume in this activity.

B. Scientific Literacy

1. Definition of Scientific Literacy

Scientific literacy involves knowledge of scientific principles and the ability to identify questions, acquire new information, explain scientific phenomena, draw conclusions based on facts, understand the characteristics of science, and be aware of the influence of science and technology on the natural, intellectual, and cultural environment. It also involves a desire to engage with and care about issues related to science.

Scientific literacy is the ability of an individual to use scientific knowledge and skills in the scientific process to understand and make decisions related to the natural environment. Additionally, it is the knowledge and scientific ability that motivates an individual to identify questions, acquire new information, explain scientific phenomena, draw conclusions based on facts, understand the characteristics of science, and be involved in shaping continuity, becoming aware of science and technology in their surroundings, intellectual and cultural aspects, and the ability to engage and care about scientific issues.

These statements form the basis for early childhood learning about the importance of scientific literacy. Referring to the Early Childhood Education (PAUD) curriculum, the approach used is a scientific approach that encourages children to be more active during learning. Moreover, it is expected that children gain experience and new information from direct observations and experiments, enabling them to interpret and build their understanding of learning.

Science literacy education encourages curiosity,

initiative, confidence, leadership, and independence. A child who learns literacy from an early age will be a lifelong learner.

The above definitions can be summarized that scientific literacy is closely related to the knowledge and skills of science to identify questions, acquire new information, explain scientific phenomena, draw conclusions based on facts, understand the characteristics of science, awareness of the influence of science and technology on the natural, intellectual, and cultural environment, and a desire to engage and care about issues related to science.

2. Scientific Literacy for 4-5 Year-Olds

Scientific literacy at the age of 4-5 involves children's ability to understand and use simple scientific concepts to explain the world around them. At this age, children begin to show a great curiosity about scientific phenomena, such as why certain objects float or sink in water or how plants grow. In the scientific literacy framework for 4-5-year-olds, there are four areas to consider: the context area, competency area, knowledge area, and attitude area.

a. Science Context Area: Includes real experiences relevant to the scientific world that can be connected to children's daily lives.
b. Science Competency Area: Encompasses scientific abilities that children should possess, such as observation, asking questions, conducting experiments, and drawing conclusions.
c. Science Knowledge Area: Involves simple scientific concepts that children should understand, such as the properties of objects, characteristics of plants, and properties of water.
d. Attitude Aspect: Encompasses positive attitudes towards science that children should possess, such as curiosity, openness to mistakes, and a desire to learn.

In conclusion, scientific literacy for children aged 4-5 is essential in forming the foundation for understanding scientific concepts in the future. There are four areas in the scientific literacy framework for children aged 4-5: the context area, competency area, knowledge area, and attitude area. To measure scientific literacy skills in children aged 4-5, an assessment instrument that aligns with this framework is necessary. This measurement can provide insights into children's abilities to understand simple scientific concepts, conduct simple observations and experiments, use appropriate language to describe scientific experiences, and demonstrate positive attitudes toward science.

Facilitating science learning for children aged 4-5 requires a fun and creative approach to ensure that children maintain their interest and curiosity about science. Here are indicators for assessing the scientific literacy of children aged 4-5:

Table 2.1
Assessment Indicators for Scientific Literacy in 4-5 Year-Olds

Variable	Indicator	Sub-Indicator
Scientific Literacy in 4-5 Year-Olds	Context Area	Capable to explain natural phenomena in a simple manner.
	Competency Area	Capable of performing experiments using safe tools and materials for simple experiments.
	Knowledge Area	Demonstrates comprehension of basic scientific concepts.
	Attitude Aspect	Displays a significant interest and curiosity

		towards the surrounding world, particularly in the context of science.
		Exhibits a sense of responsibility when using scientific tools and materials, ensuring safety.

(Yunus Abidin, Tita Mulyati 2018)

3. Steps in Science Learning Based on the Development of Scientific Literacy

The steps in science learning based on the development of scientific literacy consist of six stages that can be employed to enhance a child's scientific literacy (Syofyan and Amir, 2019):

a. Contact Phase:
   In this stage, children are introduced to the concepts or materials they will learn. The teacher's skill in explanation is crucial, as the primary task is to convey information or material to children with the aim of increasing their knowledge and understanding.
b. Curiosity Phase:
   Children are presented with questions aimed at triggering their curiosity.
c. Concept Formation Phase:
   Children explore, form, and solidify concepts until the questions from the curiosity phase are answered. Exploration, concept formation, and solidification are done through various methods such as practical work and discussions.
d. Decision-Making Phase:
   In this stage, children make decisions based on the issues raised in the curiosity phase. They are directed to make decisions in line with the material, ensuring that the solutions provided are genuinely

related to the problems faced and well understood by the children.

e. Concept Development Phase:
Children develop concepts by extracting the core learning concepts and applying them in contexts beyond the learning environment. This is done to make the knowledge acquired by children more meaningful.

f. Evaluation Phase:
This stage involves assessing the extent to which the success of the children has been achieved. The assessment conducted not only measures knowledge aspects but also assesses process aspects, application contexts, and scientific attitudes. The evaluation phase is a crucial factor in determining the success of the method.

C. Connection of the "Little Scientist" Guidebook with Scientific Literacy

Science learning for early childhood aims to introduce and instill a love for the universe, creating awareness of the greatness of the Almighty, and helping foster the interest of young children in recognizing and learning about objects and events in their surroundings. A teacher in Early Childhood Education (ECE) must be creative in designing learning to ensure that children feel comfortable, happy, entertained, not bored, and more. This is essential to ensure an enjoyable learning experience for children (Ariana, 2016).

The development of basic science skills, such as observing, inquiring, doing, discovering, and conveying findings, allows children to develop knowledge and ideas about the surrounding environment. It nurtures curiosity, responsibility, critical thinking, cooperation, openness, perseverance, and independence in life. It also encourages the use of simple technology and the application of basic scientific concepts to solve problems encountered in daily life (Rusdawati and Eliza, 2022).

Scientific literacy is closely related to the ability to

acquire scientific knowledge and skills to identify questions, obtain new information, explain scientific phenomena, and draw conclusions based on facts. It involves understanding the characteristics of science, awareness of how science and technology shape the natural environment, intellectual and cultural aspects, as well as a desire to participate and care about science-related issues. Assisting children in learning new things can be achieved through play-based learning (Sanjaya and Adhe, 2022).

To ensure the successful development of science literacy in line with the learning goals, teachers need to use varied methods and media during science lessons. Teachers must be creative in teaching models to avoid monotony. This plays a crucial role for a teacher to implement effective teaching strategies (Maulidiyah, and Fitri, 2023). The Little Scientist guidebook follows a student-centered principle, where learning occurs through play, providing direct learning experiences, and presenting learning concepts that align with children's needs and interests (Jessica and Adhe, 2020). By utilizing the Little Scientist guidebook, which includes various experiment activities with steps for conducting simple experiments for early childhood, the book integrates STEAM learning into these activities.

D. Relevant Research

Table 2.2
Relevant Research

No	Title, Author	Result, Similiarities, Differences

No	Title, Author	Result, Similiarities, Differences
1	**Title:** Science Literacy Learning Strategies for Early Childhood **Author**: Ifat Fatimah Zahro, dkk (2019)	**Result**: In this research, the method employed is a literature study based on previous research outcomes. The success of science literacy learning becomes evident when children understand what they have learned and know how to apply it to solve various daily problems. The strategy for science literacy learning in early childhood education begins with planning, including determining learning objectives, selecting materials, and considering environmental conditions. Implementation is also supported by instructional media, and evaluation is based on developmental indicators.
		Similarities: The similarity in this research lies in the variable under study, which is science literacy learning for young children.
		Differences: The difference in research lies in the method used, where this study utilizes a literature review that generates material on science literacy learning strategies.
2	**Title:** Development of Early Childhood Science Literacy through	**Result**: In this research, the researcher uses a Serial Image Media. The results of this study can be expressed as an effort to improve

No	Title, Author	Result, Similiarities, Differences
	Storytelling Method **Author:** Purwasi. N, dkk (2018)	the science literacy skills of young children through storytelling methods using serial image media. The success of this study can be seen from the average scores obtained by children in each cycle. In Cycle I, the average score obtained is 2.2. Then, in Cycle II, the average score obtained by children is 2.99. And in Cycle III, the children obtain an average score of 3.48. With the increasing average scores, this research can be an alternative to improving the science literacy skills of young children.
		Similarities: The similarity in this research lies in the variable under study, which is science literacy learning for young children.
		Differences: The difference in research lies in the use of the storytelling method in this study, whereas the researcher uses science activities or science experiments for young children.
3	**Title:** Development of Science Literacy Learning Videos for 5-6 Year Olds Learning From Home	**Result**: The results of this research are stated to be very practical as a learning medium. This is because the average practicality percentage reaches 96%, and the effectiveness percentage is 82%. It can be concluded that the science

No	Title, Author	Result, Similiarities, Differences
	Author: Rusdawat, dkk (2022)	literacy learning video media for 5-6-year-old children is considered very suitable, very practical, and very effective for use in home learning activities.
		Similarities: The similarity in this research lies in the variable under study, which is science literacy learning for young children.
		Differences: The difference in research lies in the variable x, which is in the form of learning videos, whereas the researcher uses a guidebook.

The research conducted by Ifat Fatimah Zahro et al. (2019), titled "Strategies for Science Literacy Learning in Early Childhood," shares a similarity with the current study in terms of the variable used, which is science literacy for young children. The difference lies in the method, as this study employs a literature review that generates material on science literacy learning strategies.

A relevant study by Purwasi N, et al. (2018), titled "Development of Science Literacy in Early Childhood through Storytelling Method," has a similarity in the variable under study, which is science literacy learning for young children. The difference lies in the method, as this study uses storytelling, while the current research utilizes science activities or experiments for young children.

In the research conducted by Rusdawat, et al. (2022), titled "Development of Science Literacy Learning Videos for 5-6-Year-Olds Learning From Home," there is a similarity in the variable, which is science literacy learning for young children. The difference lies in the variable x, where the study uses learning videos, whereas the current research uses a

guidebook.

Based on the presentation of the relevant previous studies, it can be understood that the upcoming research is original, and there hasn't been much research on the development of the guidebook "Little Scientist" in STEAM Learning to Improve Science Literacy Skills in 4-5-Year-Olds.

E. Hypothesis

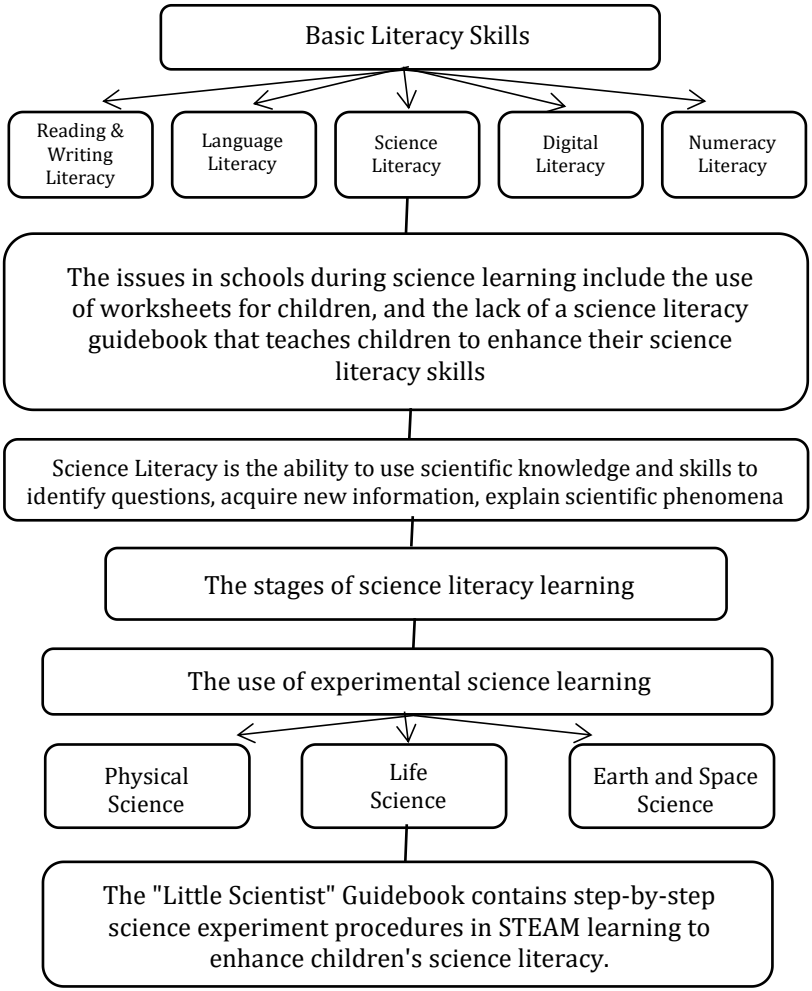
A hypothesis is a provisional answer to the research question formulated in the form of a question. Although the given answer can be considered an initial solution, it is based on relevant theory and has not been tested with empirical facts obtained through data collection. Therefore, the hypothesis can be seen as a theoretical answer to the still empirically unanswered research question. (Sugiyono, 2015). Based on the explanation above, the hypothesis in this study is:

H0: There is no influence of the "Little Scientist" guidebook in STEAM learning to improve science literacy skills in 4-5-year-olds.

H1: There is an influence of the "Little Scientist" guidebook in STEAM learning to improve science literacy skills in 4-5-year-olds.

F. Conceptual Framework

Graphic 2.1
Conceptual Framework



CHAPTER III

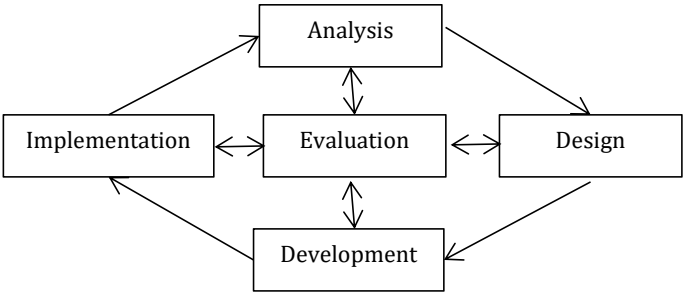
RESEARCH METHODS

A. Research Type

The type of research conducted is development research or research and development (R&D). The aim of this research is to develop and obtain a new product. The developed product takes the form of a guidebook, which is a learning resource. The "Little Scientist" guidebook with STEAM learning is expected to align with its characteristics and target audience. Therefore, a development model is needed as a guide in developing the "Little Scientist" guidebook for STEAM learning to enhance science literacy from beginning to end. One way to systematically develop it is by using the ADDIE model, accompanied by validation and revision to test the feasibility of the medium.

ADDIE (Analysis, Design, Development, Implementation, and Evaluation) is a development model used to create learning resources, adapted from Branch 2009 in Sugiyono 2019b. It is effective for creating a product and acts as a guiding framework in complex situations.

Figure 3.1
ADDIE Development Research Steps



[Branch in Sugiyono 2019]

The ADDIE model is used to develop educational products and other learning resources by providing appropriate models, strategies, learning methods, teaching materials, and media, such as the development of the "Little Scientist" guidebook in STEAM learning to enhance the science literacy of 4-5-year-old children.

The reason for using the ADDIE model in developing the "Little Scientist" guidebook for STEAM learning to enhance science literacy is:

1. To analyze needs, this model analyzes the needs and problems experienced by children. One of the needs is to stimulate children's science literacy skills using science activities found in the "Little Scientist" guidebook. With this guidebook, teachers can use science activities for classroom learning.
2. The development model focuses on the product development process and uses design stages to revise the product before production. Before production, the product must go through the design validation and revision stages.
3. This model allows testing the product to determine whether the guidebook is effective in enhancing children's science literacy skills.
4. The ADDIE model has a systematic and structured sequence of activities.
5. It has five stages that are easy to understand and implement in the creation of the guidebook.

B. Research Development Procedure

In this research, the ADDIE research and development model consisting of five stages of research and development of media and teaching materials is used. The researcher conducted research up to the evaluation stage after implementing the product on the research subjects.

1. Analysis (Analyze)

The analysis stage involves analyzing the needs of children and the problems they face. The researcher

conducted observations and analyzed books and children in schools. The analysis revealed that there is no guidebook for teachers that focuses on science literacy education with a STEAM approach. During science learning, some children were passive, merely listening to the teacher's explanations. To address these issues, the development of a guidebook is necessary for teachers to teach science literacy with a STEAM approach. The next step is to design an effective "Little Scientist" guidebook for science literacy learning.

2. Design

In this stage, the researcher determines the learning activities selected in the "Little Scientist" guidebook for STEAM learning to enhance science literacy for 4-5-year-old children. The researcher designs materials, product designs, and organizes children's science literacy learning outcomes. In this stage, the "Little Scientist" guidebook is designed based on the analyzed problems.

3. Development

The development stage is the realization of the conceptual framework that will be used as a product ready to be implemented, from design to a product tested and revised by experts. The development process includes:

a. Creation of the Little Scientist Guidebook for STEAM Learning

In this stage, the product is developed from the design to become a "Little Scientist" guidebook for STEAM learning to enhance the science literacy skills of 4-5-year-old children. The design includes the product's appearance, based on the analyzed problems.

Table 3.1
Development Design of "Little Scientist" Guidebook

No	Description	Guidebook Design
1.	**Cover**: The cover features a title that corresponds to the content of the "Little Scientist" guide.	
2.	**Table of Contents**: The table of contents provides a comprehensive list of the guide's content, outlining the various topics covered in the "Little Scientist" guide.	
3.	**Introduction to Literacy in Science and Learning**: The following page introduces the concept of science literacy and its connection to the learning process.	

No	Description	Guidebook Design
4.	**Steps in Teaching Science Literacy**: A subsequent page outlines the steps involved in teaching science literacy, providing a guide for educators.	
5.	**Main Content Section - 9 Science Experiments for Early Childhood:** The subsequent pages delve into the core content, presenting nine science experiments tailored for young children. Each experiment includes detailed steps to be followed during the scientific activities	
6.	**Assessment of Science Literacy:** A separate page is dedicated to the assessment of science literacy, providing a tool for evaluating the effectiveness of the learning process.	

No	Description	Guidebook Design
7.	**Children's Worksheets:** The next page includes worksheets designed for children. These worksheets align with the experiment themes presented in the "Little Scientist" guide, offering a practical application of the learned concepts.	

b. Validation Test

At this stage, the product undergoes validation testing by experts specializing in the content of the guidebook and early childhood learning design. The purpose of validation by content and media experts is to gather information on the alignment of content with the developed guidebook design and to obtain feedback and suggestions for revision. The feasibility of the guidebook is determined by a formula based on measurements and using material and media feasibility instruments. Validation sheets and suggestion sheets given to experts serve as a formative evaluation phase.

c. Product Revision

The results from the validation test, which include comments and suggestions from validators, are used to make improvements in the product development. The guidebook product, revised based on comments and suggestions, is then resubmitted to validators for a second-stage validation. After completing the first round of

revisions, the product is declared feasible based on calculations using the feasibility instruments.

4. Implementation

This stage involves testing the "Little Scientist" guidebook in STEAM learning to enhance science literacy in children aged 4-5. It includes pre-testing, treatment, and post-testing on 17 children aged 4-5 at TK Aisyiyah Bustanul Athfal 57 Surabaya. Teachers use the guidebook in STEAM learning to enhance children's science literacy. Implementation aims to determine the effectiveness of the guidebook in improving children's science literacy. The effectiveness of the guidebook is assessed using observation sheets to measure the learning objectives' achievement. The effectiveness is measured by percentage based on the observation criteria.

5. Evaluation

The evaluation stage aims to assess whether the product has an impact on the intended objectives. It involves formative evaluations at each stage and a summative evaluation at the end to assess whether the implementation of the "Little Scientist" guidebook in STEAM learning has achieved the expected effectiveness in improving science literacy in children aged 4-5.

C. Product Trial

1. Trial Design

The trial design in this study uses a one-group pretest-posttest design. It involves pre-testing (before treatment) and post-testing (after treatment) to determine the effectiveness and efficiency of using the "Little Scientist" guidebook for teachers. The design is illustrated as follows (Sugiyono 2019):

Pretest	Treatment	Posttest
O_1	X	O_2

One Group Pretest-Posttest Design

Explanation:

O_1: Pretest Results

X: Treatment in the form of the guidebook

O_2: Posttest Results

The design compares pretest and posttest results, allowing the researcher to draw conclusions about the difference between pretest and posttest scores. Therefore, the general concept of the researcher's design involves the following stages:

a. First Stage: Observation with Pretest
   The initial step is an observation involving a pretest conducted to measure children's science literacy before any treatment is applied.
b. Second Stage: Treatment Implementation
   The second step involves administering treatment, which introduces new knowledge.
c. Third Stage: Calculating the Mean Difference
   The third step includes calculating the mean of the differences between pretest and posttest results.
d. Fourth Stage: Drawing Conclusions
   The fourth stage is to draw conclusions about whether there is a difference between pretest (before treatment) and posttest (after treatment) results.

In this research, the trial process involves several steps before conducting the actual trial:

1) Initial Step - Pretest

   The researcher initiates activities with Group A children at TK Aisyiyah 57 Surabaya to measure the initial science literacy abilities through science activities. This initial activity involves the teacher explaining color mixing using a poster. The teacher then asks the children to explain color mixing, provides information about science, explains the science activities conducted, and tells a science-related story. Question and answer sessions

and experiments aim to assess the children's science literacy abilities. Pretesting is conducted before the treatment, and post-testing is conducted after the treatment.

2) Treatment Step
   a) First Treatment:
      - Activity: The teacher provides tools and materials for an experiment creating dancing dolls. Children are asked to conduct the science experiment following the literacy science learning steps for children, with several questions to measure science literacy abilities.
      - Goal: Children can independently conduct science experiments with questions about the experiment.
   b) Second Treatment:
      - Activity: The teacher provides tools and materials for an experiment growing water spinach. Children are asked to conduct the science experiment following the literacy science learning steps for children, with several questions to measure science literacy abilities.
      - Goal: Children can independently conduct science experiments with questions about the experiment.
   c) Third Treatment:
      - Activity: The teacher provides tools and materials for an experiment on the process of rain. Children are asked to conduct the science experiment following the literacy science learning steps for children, with several questions to measure science literacy abilities.
      - Goal: Children can independently conduct science experiments with questions about the experiment.

3) Posttest Step

The researcher concludes the activities with Group A children at TK Aisyiyah 57 Surabaya to measure their science literacy abilities through science activities after the treatment. The activity involves conducting the science activity of colored water walking, performed by the children. The teacher then asks the children to explain the process of the science experiment, presents information about science, explains the science experiment conducted, and tells a science-related story. Question and answer sessions and experiments aim to assess the children's science literacy abilities.

4) Final Step

After applying several treatments, the final step involves comparing the initial science literacy abilities before the treatment and after the treatment to obtain data for analysis. After analyzing the data, the results are used by the researcher to compile the thesis report.

2. Test Subjects

Test subjects are the participants involved in this research activity, namely the children in group A at TK Aisyiyah Bustanul Athfal 57 Surabaya, totaling 17 children. This is done to assess the effectiveness of the "Little Scientist" guidebook in STEAM-based learning to enhance the science literacy of children.

3. Types of Data

The validity and effectiveness of the product in the research are known through the types of data collection used, which include quantitative and qualitative data. Quantitative data are obtained from experts in the field and the target users. Qualitative data come from the quality testing of the product, contributing to its development. The data types support the main data and

are complemented by qualitative data, including suggestions and constructive feedback obtained from respondents.

4. Data Collection Techniques

Data collection techniques aim to obtain data from the test subjects. Questionnaires and observations are the chosen data collection techniques. The questionnaire is used to assess the feasibility for content and design experts. Observation sheets are used to evaluate the effectiveness of the Little Scientist guidebook in STEAM-based learning to improve the science literacy of 4-5-year-old children.

a. Questionnaires

Questionnaires involve presenting written questions to respondents for written responses. In this study, Likert scales are used in the questionnaires, providing clear responses such as "strongly agree, agree, disagree, and strongly disagree." The questionnaires are directed towards content and design experts to collect validity data for the Little Scientist guidebook.

The subjects for testing the validity of the "Little Scientist" guidebook in STEAM-based learning to enhance the science literacy of children include:

1) Content Expert: A lecturer with a minimum education level of S2 PG PAUD, knowledgeable in children's science learning, particularly science literacy for children.
2) Design Expert: A lecturer with a minimum education level of S2 PG PAUD, with expertise in media development, particularly print media.

Table 3.2
Questionnaire Instrument Grid for the Feasibility of the Guidebook

Variable	Sub-Variable	Indicators
Development of the guidebook "Little Scientist" in STEAM-based learning to enhance children's literacy.	Quality of content and objectives -	1) Appropriateness: Alignment between the content of the Little Scientist guidebook and the learning objectives. 2) Relevance: Materials included in the content are necessary and important for inclusion in the book. 3) Completeness: The completeness of the material presented in the guidebook is comprehensive and sequential. 4) Balance: Balance between images and text for easy understanding of the presented material. 5) Interest or attention: The attractiveness

Variable	Sub-Variable	Indicators
		of the guidebook, whether it is engaging to read.
	Instructional Quality	1) Providing maximum learning opportunities: Ensuring optimal learning opportunities. 2) Providing learning assistance for children's science: Offering learning support for children's science. 3) Quality of motivation: Instilling enthusiasm for learning using the Little Scientist guidebook during science lessons. 4) Instructional flexibility: Practicality of the conveyed learning using

Variable	Sub-Variable	Indicators
		the guidebook. 5) Quality of social instructional interaction: Material in the guidebook linked to relevant learning. 6) Impact on children and learning: Positive impact when using the guidebook. 7) Impact on teachers and learners: Positive effects for teachers and learners.
	Principles of Media Selection	1) Readability: Clear writing and font in the guidebook. 2) Ease of use: Guidebook usability during learning. 3) Quality of appearance: Suitability of media size used in the guidebook. 4) Quality of program

Variable	Sub-Variable	Indicators
		management: Usage instructions for the guidebook.

Walker & Hess dalam (Sya'banah 2019)

b. Observation

According to Sutrisno (cited in Sugiyono 2019:203), observation is a complex process that can be differentiated into two aspects based on the implementation process of data collection: participant observation and non-participant observation. In this study, non-participant observation with a structured approach is employed. The data obtained from these observations are used to assess the effectiveness of using the "Little Scientist" guidebook in STEAM-based learning to enhance children's science literacy.

Table 3.3
Observation Instrument

Variable	Indicator	Sub-Indicator
Scientific Literacy in 4-5 Year-Olds	Context Area	Capable to explain natural phenomena in a simple manner.
	Competency Area	Capable of performing experiments using safe tools and materials for simple experiments.
	Knowledge Area	Demonstrates comprehension of basic scientific concepts.
	Attitude Aspect	Displays a significant interest and curiosity

Variable	Indicator	Sub-Indicator
		towards the surrounding world, particularly in the context of science.
		Exhibits a sense of responsibility when using scientific tools and materials, ensuring safety.

(Yunus Abidin, Tita Mulyati 2018)

Table 3.4
Assessment Criteria for Observation Sheets

Score	Description
4	Developing very well
3	Developing as expected
2	Starting to develop
1	Not yet developed

(Permendikbud, 137 tahun 2013)

D. Operational Definition of Variables

1. Little Scientist Guidebook

   The Little Scientist guidebook, tailored to the dimensions of length and width according to the learning objectives, serves as a crucial tool for teachers. It aids in delivering structured and systematic content, enabling effective and efficient learning. The guidebook stimulates children to develop literacy and cognitive skills through simple experiments categorized into three activities: physical science (colorful water walking, dancing dolls, and spinning ice), life science (planting water spinach, colorful rose flowers, and blooming flowers), and earth and space science (the process of rain, volcano eruptions, and rainbow in a glass).

2. Science Literacy

Science literacy refers to one's ability to use scientific knowledge and skills in the scientific process to understand and make decisions related to the natural environment. It motivates individuals to identify questions, acquire new information, explain scientific phenomena, and draw conclusions based on facts. It also involves understanding the characteristics of science and engaging in shaping awareness of science and technology. The early childhood curriculum encourages a scientific approach, fostering curiosity, initiative, confidence, leadership, and independence.

E. Validity and Reliability

1. Validity

   According to Sugiyono (2018), is the accuracy of the data collected in the research object and can be reported by the researcher. The instrument's validity can be determined through content validity, utilizing an instrument grid for the guidebook's feasibility for teachers.

2. Reliability

   As defined by Sugiyono (2018), refers to the instrument's trustworthiness. The instrument should be correct and good, providing consistent data. Reliability testing in this study employs the Cronbach's Alpha correlation formula.

$$r_1 \quad \frac{K}{k-1^2}\ )\ (1 - \frac{\Sigma}{\sigma^2 t})$$

(Arikunto 2013)

Explanantion:

r^1	= Reliability
K	= sum of valid item
$\sum \sigma b^2$	= sum of variant score item
$\sigma^2 t$	= sum of all variant

F. Data Analysis Technique

1. Feasibility Analysis

The study uses a Likert scale, and the data obtained from the guidebook's feasibility questionnaire are analyzed using the formula provided by Sugiyono (2015). The results determine the level of feasibility of the Little Scientist guidebook.

$$P = \frac{f}{N} \times 100\%$$

(Sugiyono 2015)

Explanation :

P : Percentage number

F : Percentage of frequency

N: Total of responses x highest score x total of question

Table 3.5
Level of Product Feasibility

Percentage	Criteria	Description
81% - 100%	Very Good	Very suitable, no need for revision
61% - 80%	Good	Suitable, no need for revision
41% - 60%	Fair	Fairly suitable, needs revision
21% - 40%	Bad	Not suitable, needs revision
0% - 20%	Very Bad	Very not suitable, needs revision

(Courtesy: Riduwan)

2. Effectiveness Analysis

Effectiveness is assessed through a pretest-posttest design using the Wilcoxon signed-rank test. This method is suitable for analyzing paired-sample hypotheses with ordinal or ranked data. The Wilcoxon test involves a helper table for the calculations.

Table 3.6

Guide Table for Wilcoxon Test

No	X_{A1}	X_{B1}	**Df** $X_{A1} - X_{A1}$	**Tanda jenjang**		
				Jenjang	**+**	**-**
1						
2						
3						
Total				T =	……..	

(Sugiyono, 2019)

Explanation

X_{A1} : Before treatment value*(pretest)*

X_{A1} : After treatment value*(post test)*

$X_{A1} - X_{A1}$: *pretest – posttest*

Level : $\frac{jumlah\ ranking}{jumlah\ anak}$

Table 3.7

Correlation Coefficient

Coefficient Interval	**Correlation Level**
0,00 – 0,199	Very Low
0,20 – 0,399	Low
0,40 – 0,599	Mild
0,60 – 0,799	Strong
0,80 – 1,000	Very Strong

(Sugiyono, 2019)

CHAPTER IV

RESULT AND DISCUSSION

A. Product Development

This research was conducted at TK Aisyiyah 57 located on Semolowaru Utara Street VIII/1A, Semolowaru, Sukolilo Subdistrict, Surabaya. TK Aisyiyah Bustanul Athfal 57 Surabaya is one of the private educational institutions accredited with a B rating. The study involved 8 teachers and 17 children selected as research samples. The research aimed at developing the "Little Scientist" guidebook following the steps or stages in the ADDIE model (Analyze, Design, Development, Implementation, and Evaluation).

In the analysis phase (Analyze), the researcher analyzed issues and needs at TK Aisyiyah Bustanul Athfal 57 Surabaya. Moving to the design phase (Design), the researcher designed the content and layout of the "Little Scientist" guidebook. In the development phase (Development), the researcher created the guidebook, and then validation was conducted involving media and subject matter experts to ensure its validity. Subsequently, in the implementation phase (Implementation), field trials were carried out with 8 teachers at TK Aisyiyah Bustanul Athfal 57, including surveys with 17 children to assess the effectiveness of the "Little Scientist" guidebook by conducting pretests, three treatment sessions, and post tests.

The following explains the stages of developing the "Little Scientist" guidebook based on the ADDIE model:

1. Analyze:
    a. Problem Analysis at TK Aisyiyah Bustanul Athfal 57 Surabaya:

        In science learning, there are issues related to science literacy education. Although science literacy activities are appealing to children, they are challenging for them. At TK Aisyiyah, science literacy activities did not meet the specified criteria. Observations and interviews with teachers revealed

issues, including classroom conditions, materials used, and how children learn in school. The current approach involves the teacher explaining steps to complete worksheets, limiting interaction between teachers and children.

Interviews indicated the lack of a guidebook to improve children's science literacy skills, leading to many TK teachers not understanding the stages in science literacy education. Hence, a science literacy guidebook is essential for teachers, providing guidance for science literacy activities aligned with children's developmental stages.

b. Analysis of Children's Characteristics According to Age:

The learning environment plays a crucial role, and adequate facilities significantly impact children's learning outcomes. In the context of science literacy education, providing suitable tools based on children's age stages is essential. For 4-5-year-olds, characterized by high activity levels, there was a lack of varied activities to enhance their science literacy skills.

Considering these issues, new innovations in learning resources are needed. One innovation is the use of the "Little Scientist" guidebook to boost children's science literacy skills. The guidebook aims to provide a better understanding of science literacy education stages for teachers.

c. Analysis of the Need for the "Little Scientist" Guidebook:

In science literacy education, a reliable source of knowledge is crucial, and the lack of learning resources poses a challenge for TK Aisyiyah Bustanul Athfal 57 Surabaya teachers. The science literacy guidebook offers information and knowledge for teachers to conduct effective science

literacy education. With this guidebook, teachers can systematically provide science literacy education, utilizing age-appropriate tools and materials through simple experiments. This approach helps children gain a better understanding of science, fostering their interest in the field.

2. Design

After field analysis, the next step is designing the product concerning the guidebook's content and creating the design for easier understanding by teachers and educators.

a. Material Design:

The initial step in creating the science literacy guidebook is to design the content. This stage involves searching for and collecting information related to science literacy education. Subsequently, the next step is to choose materials based on the analysis of needs and objectives in the field. The content for the science literacy guidebook is obtained from reliable references.

The guidebook is designed comprehensively and arranged systematically, aligning with the learning objectives. The aim is to facilitate TK teachers in understanding the content of the science literacy guidebook. At this stage, the researcher designs the material in collaboration with the supervisor. The goal is to ensure that the development of the science literacy guidebook aligns with the characteristics and developmental stages of children, making it suitable for the teaching provided by the teachers.

b. Little Scientist Guidebook Product Design

At this stage, the design of the science literacy guidebook is carried out based on the field's needs analysis. This analysis is grounded in collected data, including observations and interview results. After

analyzing these needs, the next step is to determine the conceptual design of the guidebook. The science literacy guidebook is designed to be visually appealing, using attractive colors, organized systematically, and employing language that is easily understandable by teachers or readers. The cover of the science literacy guidebook is designed with an attractive appearance and vibrant colors. It features an image of a child conducting a science experiment, the names of the researcher and supervisor involved in developing the guidebook, and the title "Little Scientist" displayed prominently.

The content of the guidebook includes materials on science literacy education for early childhood, covering the stages of science literacy education and assessment for young children. Additionally, there are nine types of experiment activities: walking colored water, magnetic car, spinning ice, growing water spinach, colorful roses, blooming flowers, the process of rainfall, volcanic eruption, and rainbow in a glass. The science literacy activities in this book are enriched with STEAM-based learning, accompanied by explanations for each activity. It also includes activity sheets for children that correspond to the theme of the science experiments they engage in.

3. Development:

In this stage, the science literacy guidebook is realized using Adobe Illustrator software for the production process. This software serves for illustration and editing the layout of the science literacy guidebook. The guidebook is printed with dimensions of 22x23.5 cm on art paper. The following are the results of the production process for the guidebook.

Table 4.1
The Development of "Little Scientist" Guidebook

Next, the researcher undergoes a validation process involving an expert in media and material. The purpose of this validation is to evaluate whether the science literacy guidebook is suitable for use. The results of this validation provide information about the book's suitability. Based on these results, improvements can be made to the science literacy guidebook product. The following are the results of validation by material and media experts:

a. Material Expert Validation:

Material expert validation was conducted by an expert from the Early Childhood Education lecturer at the Faculty of Education, State University of Surabaya. The validity assessed by the material expert looked at comprehensive understanding, content, feasibility, and material presentation strategy. The material expert suggested adding

more content on early childhood science literacy in the guidebook. After revising according to the material expert's guidance, material expert validation was conducted. The results of the material expert validation obtained a score of 43 out of a maximum score of 44, indicating a percentage of 43/44: 100% = 97.72%.

Table 4.2
Validation Score From Material Expert

No	Aspects assessed	Item Number	Score
1	Comprehensive understanding	1,2	8
2	Content substance	3,4,5	12
3	Appropriateness and presentation strategy	6,7,8,9,10,11	23
Total			43

Based on the assessment results, the Little Scientist guidebook media product falls into the valid category and is highly suitable for use.

b. Media Expert Validation:

Media expert validation was conducted by an expert from the Early Childhood Education lecturer at the Faculty of Education, State University of Surabaya. The validity assessed by the media expert looked at attractiveness, readability, and quality of management aspects. The media expert suggested enlarging the font size in the guidebook. After revising according to the media expert's guidance, media expert validation was conducted. The results of the media expert validation obtained a score of 67 out of a maximum score of 68, indicating a percentage of 67/68: 100% = 98.52%.

Table 4.3
Validation Score From Media Expert

No	Aspect Assessed	Item Number	Score
1	Attractiveness	1,2,3,4,5	20
2	Readability	6,7,8,9,10,11	23
3	Quality of Management	12,13,14,15,16,17	24
Total			67

Based on the assessment results, the Little Scientist guidebook media product falls into the valid category and is highly suitable for use.

After the validity stage, the next step is the reliability test of the observation sheet, aimed at determining the level of instrument validity on the observation sheet. The reliability test of the observation sheet uses Cronbach's alpha, employing SPSS 25. A variable can be considered consistent (reliable) if the Cronbach's alpha coefficient value is ≥ 0.6. Data collection was conducted during the research observation at TK Aisyiyah Bustanul Athfal 39 Surabaya. The data presentation of the research results, which will be tested for validity and reliability, is shown in the table below:

Table 4.4
Observation Results of TK Aisyiyah 39 Surabaya

No	Name	Science Literacy Indicator Assessment					Total
		1	2	3	4	5	
1	AI	4	4	3	4	4	19
2	NI	4	4	4	4	4	20
3	ZI	3	3	3	3	3	15

No	Name	Science Literacy Indicator Assessment					Total
		1	2	3	4	5	
4	NO	3	3	3	4	3	16
5	GA	3	4	4	4	3	18
6	IV	2	3	3	3	2	13
7	RA	4	2	4	3	2	15
8	HA	3	3	3	4	3	16
9	RF	3	2	3	4	3	15
10	HI	2	3	2	3	2	12
11	HN	2	3	3	4	3	15
12	IB	3	3	3	4	3	16
13	KE	3	2	3	3	2	13

The results of the observation will undergo a reliability test, which will be presented in the table below:

Table 4.6
Reliability Test Result

Cronbach's Alpha	***N of Items***
.780	5

The reliability test results with 5 items show that all these assessment variables have a Cronbach's Alpha coefficient of 0.780 because 0.780 is greater than 0.60. Thus, the observation sheet used as a measurement during the application is declared reliable.

4. Implementation
   a. Field Trial Stage

      In this stage, the product titled "Little Scientist Guidebook" will be tested with 17 children and 8

teachers at TK Aisyiyah Bustanul Athfal 57 Surabaya. In this phase, teachers are given questionnaires to fill out, while children will follow the learning activities outlined in the guidebook by engaging in science literacy learning.

At this stage, the researcher gathered 8 teachers and prepared the Little Scientist guidebook. The book was then presented, and a Q&A session was conducted to clarify the product. The teachers expressed positive appreciation for this new innovation. According to them, there hasn't been a science literacy guidebook that could be used as a learning resource before. With the existence of this science literacy guidebook, they feel assisted in understanding and applying science literacy learning more profoundly.

Subsequently, questionnaires were distributed to the teachers to determine the product's feasibility for use in the field based on the teachers' assessments in the questionnaire. The table below shows the scores obtained from the 8 kindergarten teacher respondents:

Table 4.7
Scoring result from the kindergarten teacher

No	Responden Name	Score
1	K	96%
2	NF	89%
3	SQ	89%
4	A	96%
5	SW	100%
6	H	86%
7	MU	86%
8	SR	86%

$$\text{Average score} = \frac{(96+89+89+96+100+86+86+86)}{8}$$

$$= 91\%$$

Based on the questionnaire results, a feasibility percentage of 91% was obtained.

The next stage is for teachers to provide lessons to the children, referring to the science literacy guidebook. The aim of this stage is to measure the success of the product, besides the teacher questionnaire assessment, and determine if the "Little Scientist" guidebook can be used to help improve children's science literacy development. In this stage, observation techniques are employed to observe the ongoing learning process. The effectiveness of the guidebook is assessed based on the percentage results of the pretest and post test.

b. Observation Results

After validation by media and subject matter experts, the research continued with the learning process inside the classroom involving 17 children. This study aimed to test the effectiveness of the "Little Scientist" guidebook in kindergarten through the assessment of children's abilities. The research results from observations conducted at TK Aisyiyah Bustanul Athfal 57 for 5 sessions. The researcher implemented a product trial using the pre-experimental design method, specifically the one-group pretest-posttest design. Here are the details of the Little Scientist guidebook implementation stages:

1) First stage: A pretest was conducted for the kindergarten children as a measurement of the level of science literacy before the treatment. The pretest involved learning activities about color mixing using a poster. The data presentation of the research results on the development of the Little Scientist guidebook for children at TK Aisyiyah 57 can be seen in the table below:

Table 4.8
Recapitulation of Pretest Score Result

No	Name	Science Literacy Indicator Assessment					Total
		1	2	3	4	5	
1	**AI**	2	3	3	2	2	12
2	**P**	2	2	1	2	2	9
3	**K**	3	2	3	2	2	12
4	**F**	2	2	2	2	3	11
5	**H**	3	3	3	3	2	14
6	**NS**	2	2	2	2	2	10
7	**R**	2	3	2	2	3	12
8	**KI**	3	2	3	2	2	12
9	**M**	1	2	2	2	2	9
10	**IK**	2	2	2	2	2	10
11	**ND**	2	2	2	3	3	12
12	**NU**	3	3	3	3	2	14
13	**EL**	3	3	3	3	2	14
14	**IC**	1	2	1	2	2	8
15	**EZ**	2	2	2	2	1	9
16	**NI**	2	2	2	2	2	10
17	**AH**	1	2	2	2	3	10
Total		36	39	38	38	37	188

2) Second stage: A treatment 1 was administered to the children, involving stimulation through a lesson on the experiment of making a spinning

ice. This aligns with the steps of children's science literacy learning, providing an understanding of the transformation from liquid to solid. The children conducted experiments on making ice cream, expressing their comprehension of the science behind the transformation of a liquid into a solid. The children were able to answer several questions posed by the teacher, displaying enthusiasm during the lesson on the experiment of making spinning ice. This enthusiasm stemmed from the direct involvement of children in understanding the transformation of a liquid into a solid. Additionally, the lesson on making spinning ice was linked to STEAM learning, encouraging children to connect concepts and skills from various disciplines and apply them in real-world contexts, often encountered in daily life, such as freezing ice.

3) Third stage: A treatment 2 was administered to the children, involving stimulation through a lesson on planting water spinach seeds. This aligns with the steps of children's science literacy learning, providing an understanding of how to plant and care for water spinach plants until they grow into vegetables. The children expressed their understanding of planting and caring for water spinach plants. Similar to the previous treatment, this lesson on planting vegetables was linked to STEAM learning, encouraging children to connect concepts and skills from various disciplines and apply them in real-world contexts, commonly applied in children's daily lives regarding plant care.
4) Fourth stage: A treatment 3 was administered to the children, involving stimulation through a lesson on the experiment of a volcanic

eruption. This aligns with the steps of children's science literacy learning, providing an understanding of the dangers of a volcanic eruption and how it occurs. The children expressed their understanding of volcanic eruptions and how they occur. This lesson on a volcanic eruption was linked to STEAM learning, encouraging children to connect concepts and skills from various disciplines and apply them in real-world contexts. This activity aids children in understanding natural phenomena in their surroundings.

5) Fifth stage: A post test was administered to the children, involving stimulation through a lesson on color mixing, specifically the flow of colored water. The children began to understand and easily use the tools needed to conduct experiments. The children's enthusiasm and spirits increased during the experiment. The color mixing experiment was conducted in line with the steps of children's science literacy learning, providing children with an understanding of how colors work and how they can be mixed to produce new colors.

Here is the data presentation of the development of the Little Scientist guidebook to improve children's science literacy skills at TK Aisyiyah 57 Surabaya, as seen in the table below:

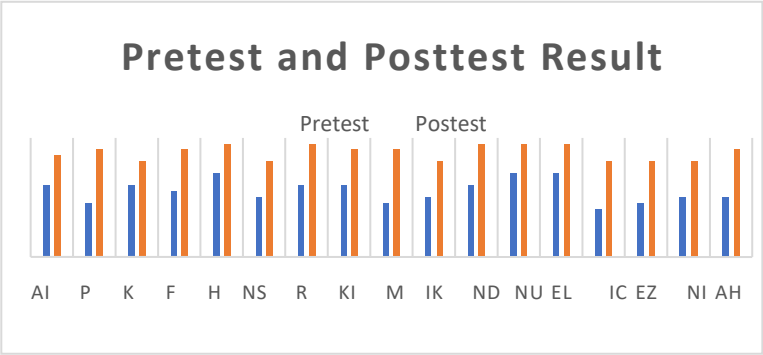
Table 4.9
Recap of Post test Score Result

No	Name	Science Literacy Indicator Assessment					Total
		1	2	3	4	5	
1	**AI**	3	4	4	3	3	17
2	**P**	3	4	3	4	4	18

No	Name	Science Literacy Indicator Assessment					Total
		1	2	3	4	5	
3	**K**	3	3	3	4	3	16
4	**F**	3	4	3	4	4	18
5	**H**	4	4	3	4	4	19
6	**NS**	3	3	4	3	3	16
7	**R**	4	4	3	4	4	19
8	**KI**	4	3	4	4	3	18
9	**M**	3	4	3	4	4	18
10	**IK**	3	3	3	4	3	16
11	**ND**	3	4	4	4	4	19
12	**NU**	4	3	4	4	4	19
13	**EL**	4	4	4	4	3	19
14	**IC**	3	3	3	4	3	16
15	**EZ**	3	3	3	4	3	16
16	**NI**	3	3	3	4	3	16
17	**AH**	3	4	3	4	4	18
Total		56	60	57	66	59	298

The results of the posttest activity indicate a positive change in scores, which can be interpreted as an impact after implementing the treatment using the Little Scientist guidebook. The comparison of pretest and posttest scores for each child can be seen in the following graphical representation:

Figure 4.1
Pretest and Post test Result Chart



c. Data Analysis

After going through the aforementioned implementation stages, the results of the pretest and posttest will be processed to determine the effectiveness level of the Little Scientist literacy guidebook. The following are the results of the analysis of this process:

1) Effectiveness Analysis

This study employs nonparametric statistical methods, specifically using the Wilcoxon test in SPSS 25 to examine the effectiveness of the "Little Scientist" guidebook. Before processing the data, the researcher formulated the hypotheses for this study as follows:

H0: There is no influence of the Little Scientist guidebook in STEAM learning to improve the literacy skills of 4-5-year-old children.

H1: There is an influence of the Little Scientist guidebook in STEAM learning to improve the literacy skills of 4-5-year-old children.

The following are the results of the effectiveness analysis using Wilcoxon with SPSS 25:

Table 4.12
Wilcoxon Test Rank

Statistic Test	Post test-Pretest
Z	-3.638[b]
Asymp. Sig. (2-tailed)	.000

a.Wilcoxon Signed Ranks Test
b.Based on negative ranks.

Based on the Wilcoxon single ranks test statistics table, it shows that Asymp Sig (2-tailed) is 0.000, so P < 0.05 or 0.000 < 0.05. Therefore, H0 is rejected, and H1 is accepted. It can be concluded that the Little Scientist guidebook has an influence on improving the literacy skills of 4-5-year-old children. Based on the calculation results, the Little Scientist guidebook is effective in enhancing children's literacy skills.

5. Evaluation (Evaluate)

During the analysis, design, development, and implementation stages, there was formative evaluation of the product, aiming to ensure that each ADDIE process was executed correctly before moving on to the next stage. If revisions were needed before proceeding to the next stage, they were implemented.

In this study, formative evaluation was conducted at each ADDIE stage, and the evaluations at each stage are explained as follows:

a. Analyze: the evaluation of the analysis stage concluded that the way to develop science literacy skills in 4-5-year-old children is through the use of the Little Scientist guidebook, which serves as a learning resource for teachers.
b. Design: the evaluation of the design stage concluded

that the content of the media should also consider text layout to facilitate teachers' reading.

c. Development: before moving to the implementation stage, the instrument assessment results from content experts and media experts provided a percentage in the highly feasible category. The guidebook was revised twice; content expert feedback led to additional content about children's science literacy, and media expert feedback emphasized the need to enlarge the font size in the guidebook.

d. Implementation: from the designed activities for improving the science literacy skills of 4-5-year-old children.

Summative evaluation was conducted to determine the final results of the development research. The final results indicated that the implementation was valid, practical, and effective. Therefore, the Little Scientist guidebook is essential in STEAM learning to enhance the science literacy skills of 4-5-year-old children and serves as a teacher's learning resource on children's science literacy.

B. Discussion

The final result of this development is the "Little Scientist" guidebook to improve the science literacy skills of 4-5-year-old children. The guidebook, containing science literacy activities for children, has been applied in TK Aisyiyah Bustanul Athfal 57. This guidebook can be utilized to address learning problems, especially in children's science literacy. Additionally, teachers can use it to obtain information about the steps in science literacy learning. The discussion of the development results of the Little Scientist guidebook to improve the science literacy skills of 4-5-year-old children is as follows:

1. Steps of children's science literacy learning

According to Syofyan and Amir (2019), there are six stages in science literacy-based learning that can be used

to enhance the science literacy of children. These stages include:

a. Contact Stage: Introducing children to the concept or material to be learned. The teacher plays a crucial role in explaining the material effectively for children to understand. This stage involves preparing images to introduce children to the upcoming activities.
b. Curiosity Stage: Presenting questions to stimulate children's curiosity about the material being learned. Following the contact stage using images, children are given several questions to stimulate their curiosity.
c. Concept Formation Stage: Children explore, form, and solidify concepts through various methods such as experiments and discussions. In this concept formation stage, children are asked to perform experiments for forming and solidifying concepts. The goal is to answer questions raised in the curiosity stage.
d. Decision-Making Stage: Children make decisions based on the issues raised in the curiosity stage. They are directed to make decisions related to the learned material and understand it well.
e. Concept Development Stage: Children develop concepts by applying the core concepts learned to real-world contexts. This aims to provide a deeper meaning to the knowledge acquired by children. In this concept development stage, children will understand directly how the experiment process they conducted works; for example, in the "walking color water" experiment, children will learn how the color works when mixed.
f. Evaluation Stage: This stage involves assessment to measure how successful children have been in learning. Evaluation not only measures children's knowledge but also involves aspects of the process, application context, and scientific attitudes. The

evaluation stage is a crucial factor in determining the success of the teaching method used.

2. Indicators for assessing children's science literacy

Based on the context of science literacy for 4-5-year-old children, there are several areas for assessing the science literacy skills of 4-5-year-old children. These areas include context, competence, knowledge, and attitude (Yunus Abidin, Tita Mulyati 2018). The following is an explanation of several areas for assessing science literacy:

a. Context Area: Children can explain natural phenomena simply. They have the ability to provide simple explanations of the experiments they conduct. In this assessment, at the end of the lesson, children are asked to explain the process of color science in the "walking color water" activity.
b. Competence Area: Children can conduct experiments using safe tools and materials for simple experiments. Children can perform simple experiments with guidance and supervision, using safe tools and materials. In this assessment, the teacher observes how children use tools and materials according to their functions.
c. Knowledge Area: Children understand simple science concepts. They have a basic understanding of simple science concepts. In this assessment, children are evaluated through questions related to the experiments they conducted.
d. Attitude Area: In this attitude area, there are two assessments. First, children show a great interest and curiosity about the world around them, including in science. Children show significant interest and enthusiasm for scientific knowledge during experiments. Second, children can demonstrate responsibility in using science tools and materials safely. They understand the importance of safety in conducting experiments and

take responsibility for using science tools and materials.

In science literacy for 4-5-year-old children, it is important to provide direct experience, observation, and simple experiments that match the interests and abilities of the children.

3. Components of STEAM Activities in Children's Science Literacy Learning

The components of STEAM (Science, Technology, Engineering, Art, and Mathematics) in early childhood science literacy learning (Novitasari, 2022) can be explained as follows:

a. Science: Children have a natural ability to be scientists. They use scientific methods such as observation, formulating questions, designing experiments, and discussing to understand how the world around them works.
b. Technology: Technology encompasses all objects created by humans. Children can learn about simple tools used during experiments.
c. Engineering: Children play the role of engineers as they use tools and materials to complete an experiment.
d. Art: Creative thinking is essential, especially for children to innovate and creatively find solutions to problems. Art provides opportunities for children to explore sensory experiences, feel textures, and see colors.
e. Mathematics: Mathematics involves numbers, measurements, patterns, and geometry.

The application of STEAM in the Little Scientist guidebook to enhance children's science literacy skills is presented in Table 4.13.

Table 4.13
Application of STEAM in the Guidebook

Application of STEAM in the Guidebook		
Activities		STEAM Components
Treatment 1	Experiment on Making Spinning Ice Cream	a) Science, science in the activity of making spinning ice cream involves learning about the transformation of the state of matter from liquid to solid. b) Technology, technology in the activity of making spinning ice cream is evident in the use of tools such as a spoon to pour the ingredients used during the experiment of making spinning ice cream. c) Engineering, engineering in the activity of making spinning ice cream is seen

		when children go through the process of making spinning ice cream until it is finished. d) Art, art in the activity of making spinning ice cream is found in decorating the spinning ice cream using toppings. e) Mathematics, mathematics in the activity of making spinning ice cream is present in the process of calculating the quantity of ice cream to be made.
Treatment 2	Growing Water Spinach (Kangkung)	a) Science, the science in the activity of growing water spinach is present in the process of observing the growth of water spinach,

		and understanding the different parts of the water spinach plant. b) Technology, technology in the activity of growing water spinach is evident in how tools such as a shovel are used during the process of planting water spinach. c) Engineering, engineering in the activity of growing water spinach is found in the process of the child planting water spinach. d) Art, art in the activity of growing water spinach is present in decorating the pot that will be used for planting water spinach. e) Mathematics,

		mathematics in the activity of growing water spinach is found in determining the quantity of soil to be placed in the pot for planting water spinach and calculating the water spinach seeds.
Treatment 3	Volcano Eruption Experiment	a) Science, science in the volcano eruption experiment involves simulating the process of a volcanic eruption that produces a simple representation of the eruptive process and the discharge of lava. b) Technology, technology in the volcano eruption experiment is evident in how tools such as

		spoons, plastic cups are used during the activity. c) Engineering, engineering in the volcano eruption experiment is found in the process of children making and conducting the experiment. d) Art, art in the volcano eruption experiment is present during the creation of a miniature volcano. e) Mathematics, mathematics in the volcano eruption experiment involves determining the quantity of materials to be poured into the miniature volcano, understanding more or less for the

		experiment.
Post test	Color Walking Water Experiment	a) Science, the science in the color walking water experiment involves the process of color mixing. Children will learn how mixing colored water will result in new colors. b) Technology, technology in the color walking water experiment is evident in how tools such as a pipette are used during the activity. c) Engineering, engineering in the color walking water experiment is found in the process of creating and completing the experiment. d) Art, art in the color walking water

		experiment is present as children become familiar with various colors such as red, green, yellow, orange, and blue. e) Mathematics, mathematics in the color walking water experiment involves children learning about the volume of more or less water to be poured into the glasses. They also learn about patterns in mathematics.

4. Implementation of STEAM in Children's Science Literacy Learning

In the development study of the Little Scientist guidebook to improve science literacy skills, the researcher applied STEAM (Science, Technology, Engineering, Art, and Mathematics) learning to young children, involving several aspects: questioning, exploring and observing, developing skills and processes, communicating, and playing (Suci Utami, 2019). The following are activities that can be carried out for each

aspect with young children:

a. Questioning: Children are encouraged to ask questions about objects or events around them. The teacher can stimulate critical thinking and curiosity by providing opportunities for children to ask and explore answers. In addition to children, the teacher also asks several questions. Example activity: before starting an experiment, the teacher shows picture objects related to the learning, such as liquid (milk) and solid (ice cream), then asks children to ask questions about what they see. The teacher also asks questions about the picture objects.
b. Exploring and Observing: Children are actively encouraged to explore their environment and observe using their senses. Through these activities, they can develop observation and research skills. Example activity: The teacher shows various tools and materials to be used during the experiment, and children can see and feel them directly.
c. Developing Skills and Processes: Children are encouraged to build, create, and use various materials and techniques. They are also introduced to information processing skills. Example activity: The teacher provides an experiential activity by explaining how to complete the experiment, and then children process this information to complete the experiment.
d. Communicating: Children are encouraged to develop language skills and communicate with others. They learn to work individually or in groups, share and discuss ideas through conversations and listening. Example activity: At the beginning of the activity, the teacher holds a small discussion about the upcoming activity, allowing children to share their knowledge and exchange ideas. During science literacy learning, there are collaborative activities to complete experiments, such as the volcano eruption experiment. At the end of the lesson,

children are asked to orally convey their observations using simple language.

e. Playing: STEAM learning in early childhood can be done through a play-based approach. Through play, children can learn in an enjoyable way. Example activity: Activities conducted during STEAM-infused science literacy learning involve simple experiments, and they are carried out in a playful manner.

5. Aligning Teachers' Perception with the Little Scientist Guidebook

The Little Scientist guidebook presents well-structured content about teaching science literacy to young children. The book contains a series of materials explaining science literacy concepts suitable for young children. Additionally, the guidebook provides practical steps for implementing science literacy learning in the classroom, various activities to enhance children's science literacy skills, and assessments to help teachers evaluate children's science literacy abilities. Thus, the book facilitates teachers in understanding and independently implementing science literacy learning in the classroom.

To align teachers' perceptions with the Little Scientist guidebook during the research, the following steps were taken: carefully studying the guidebook, asking teachers to read and thoroughly understand the guidebook, conducting discussions about the guidebook, and sharing understanding, ideas, and questions to align perceptions. With these steps, it is expected that teachers' perceptions can be better aligned with the guidebook that serves as a reference for science literacy learning for 4-5-year-old children.

Based on the validation test results, the expert material validation obtained a percentage of 97.72%, categorizing the Little Scientist guidebook as highly feasible. Meanwhile, the media expert validation

obtained a percentage of 98.52%, also categorizing the guidebook as highly feasible for teachers as a learning resource to enhance the science literacy skills of 4-5-year-old children.

Furthermore, the results of the development of the guidebook to determine its effectiveness were assessed using observation sheets during the observation. The researcher used SPSS 25 with the Wilcoxon test. Based on the output of the Wilcoxon test using SPSS 25, Asymp Sing (2-tailed) was 0.000, so $P < 0.05$ or $0.000 < 0.05$. Therefore, H0 is rejected, and H1 is accepted. It can be concluded that the Little Scientist guidebook has an influence on improving the science literacy skills of 4-5-year-old children, as evidenced by an increase in the pretest and post test results of 17 respondents.

CHAPTER V

CONCLUSION AND RECOMMENDATION

A. Conclusion

After going through all the stages of the ADDIE model development, from the analysis stage to the evaluation stage, the development of the science literacy guidebook can be summarized as follows:

1. After the development of the science literacy guidebook was completed, a validation test was conducted using questionnaires for content experts and media experts. Based on the validation test results, the material expert validation obtained a percentage of 97.72%, categorizing the Little Scientist guidebook as highly feasible. Meanwhile, the media expert validation obtained a percentage of 98.52%, also categorizing the guidebook as highly feasible for teachers as a learning resource to enhance the science literacy skills of 4-5-year-old children.
2. In this study, the researcher conducted a Wilcoxon test analysis to measure the effectiveness of the Little Scientist guidebook, showing that Asymp Sing (2-tailed) was 0.000, so $P < 0.05$ or $0.000 < 0.05$. Therefore, H0 is rejected, and H1 is accepted. It can be concluded that the Little Scientist guidebook has an influence on improving the science literacy skills of 4-5-year-old children.

B. Recommendation

1. Utilization Recommendations:

   The utilization of the science literacy guidebook is expected to provide every teacher with access to new knowledge and information. The main goal is for teachers to optimally utilize this new knowledge in implementing learning at school. Teachers are encouraged to follow the stages outlined in the science literacy guidebook during their teaching.

2. Dissemination Recommendations:

   If the science literacy guidebook is to be used in other schools, a reassessment is necessary, especially regarding needs analysis, school environment, learning time, and required budget.

3. Developer Recommendations:

   For future developers, it is recommended to consider the following in using the science literacy guidebook:

   a. Ensure that the sentence structure or words in the science literacy guidebook align with the standardized language rules.
   b. Pay more attention to the quality of the science literacy guidebook and enhance innovation in its development process.

4. Recommendations for Future Researchers:

   The results of this study are expected to serve as a reference for future researchers to develop products with even better quality.

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Appendix 1

Research Schedule

No	Date	Location	Activity
1	Tuesday, 16 May 2023	TK Aisyiyah Bustanul Athfal 57	Reliability test
2	Friday, 19 May 2023	TK Aisyiyah Bustanul Athfal 57	Pretest
3	Monday, 22 May 2023	TK Aisyiyah Bustanul Athfal 57	Treatment 1
4	Tuesday, 23 May 2023	TK Aisyiyah Bustanul Athfal 57	Treatment 2
5	Wednesday, 24 May 2023	TK Aisyiyah Bustanul Athfal 57	Treatment 3
6	Thursday, 25 May 2023	TK Aisyiyah Bustanul Athfal 57	Post test

Appendix 2

Validation Result by Media Expert

VALIDATION SHEET FOR MEDIA EXPERT

Research Title	: Development of the "Little Scientist" Guidebook in STEAM Learning to Improve Science Literacy Skills in 4-5 Year-Old Children
Author/Researcher	: Siti Nur Fadilah
Student ID	: 19010684080
Media Expert Name	: Kartika Rinakit Adhe, S.Pd., M.Pd.
NIP	: 199006152015042002
Institution	: Universitas Negeri Surabaya

Introduction

Respected [Mr./Mrs.], May I respectfully request your willingness to provide an assessment of the design presented in the media developed by the researcher through this validation sheet. This sheet contains questions directed towards the media developed by the researcher. This instrument is used to evaluate the feasibility of the media developed by the researcher in the learning process. I express my gratitude for your cooperation and willingness to provide an assessment.

A. Instructions for Completion

a. Fill out this assessment sheet by marking a check (√) in the provided rating scale column.
b. The rating scale indicators are as follows:
   1: Not Good
   2: Fair
   3: Good
   4: Very Good
c. After completing the assessment, you are kindly requested to provide opinions, criticisms, suggestions, and draw conclusions regarding the feasibility of the learning media in the provided column.

I extend my thanks for your willingness to assess this instructional media.

Assessment Sheet

No	Variable	Sub Variable	Indicator	Assessment			
				4	3	2	1
1	Attractiveness	Quality of Book's Presentation	Is the layout of the front and back cover harmonious?	√			
2			Does the cover illustration accurately depict the content?	√			
3			Is the composition and size of the layout proportional?	√			
4			Are the color elements on the cover harmonious and enhance the clarity of the guidebook?	√			
			Is the overall presentation of illustrations appropriate?	√			
5	Readability	Clarity of writing	Is the choice of font type appropriate?	√			
6			Is the font size proportional?		√		
			Are font variations (bold, italic, capital) used appropriately?	√			
7			Does the placement of titles and learning activities not disrupt readability?	√			
8			Are images/objects appropriately placed?	√			
9			Is there an appropriate balance of text within the content?	√			
10	Quality of Management	Use of Guidebook	Does the guidebook contribute to the effectiveness of	√			

No	Variable	Sub Variable	Indicator	Assessment			
				4	3	2	1
			learning outcomes?				
11			Does the guidebook provide benefits in achieving effective learning outcomes?	√			
12			Does the guidebook contain elements/components related to science literacy activities?	√			
13			Does the use of the guidebook give teachers a sense of satisfaction in acquiring new information?	√			
14			Was the guidebook produced at a low cost?	√			
15			Does the guidebook have good quality and meet expectations?	√			

Walker & Hess (inside Arsyad 2013:219)

A. Comment and Suggestion

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B. Conclusion

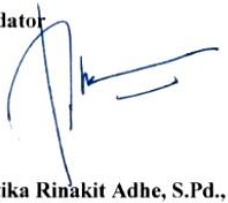
Based on the assessment above, the Little Scientist Guidebook is declared:

1. The Little Scientist Guidebook is valid without any revisions.
2. The Little Scientist Guidebook is valid with minor revisions.
3. The Little Scientist Guidebook is valid without any revisions.
4. The Little Scientist Guidebook is valid without any revisions.

*) Please circle one of them.

Surabaya, May 16 2023

Validator



Kartika Rinakit Adhe, S.Pd., M.Pd.

NIP. 199006152015042002

Appendix 3

Validation Result by Materials Expert

VALIDATION SHEET FOR MATERIALS EXPERT

Research Title	: Development of the "Little Scientist" Guidebook in STEAM Learning to Improve Science Literacy Skills in 4-5 Year-Old Children
Author/Researcher	: Siti Nur Fadilah
Student ID	: 19010684080
Materials Expert Name	: Kartika Rinakit Adhe, S.Pd., M.Pd.
NIP	: 199006152015042002
Institution	: Universitas Negeri Surabaya

Introduction

Respected [Mr./Mrs.], May I respectfully request your willingness to provide an assessment of the materials presented in the media developed by the researcher through this validation sheet. This sheet contains questions directed towards the media developed by the researcher. This instrument is used to evaluate the feasibility of the media developed by the researcher in the learning process. I express my gratitude for your cooperation and willingness to provide an assessment.

A. Instructions for Completion

a. Fill out this assessment sheet by marking a check (√) in the provided rating scale column.
b. The rating scale indicators are as follows:
   1: Not Good
   2: Fair
   3: Good
   4: Very Good
c. After completing the assessment, you are kindly requested to provide opinions, criticisms, suggestions, and draw conclusions regarding the feasibility of the learning media in the provided column.

I extend my thanks for your willingness to assess this instructional media.

Assessment Sheet

No	Variable	Sub Variable	Indicator	Assessment			
				4	3	2	1
1	Comprehensive understanding	Precision with the Characteristics of Children's Science Literacy	Is learning scientific literacy easy for children?	√			
2			Can the Little Scientist guidebook develop the scientific literacy skills of children?	√			
3	Content substance	Completeness of material as self-learning resources	Are the steps of scientific experiments to improve scientific literacy easy for teachers to understand?	√			
4			Are the activities presented appealing to children's interest in learning scientific literacy with the guidebook?	√			
5			Are the steps of the experiments easy to follow?	√			
6	Appropriateness and presentation strategy	Suitability of material presentation	Is the sequence of material in the Little Scientist guidebook to enhance scientific literacy in accordance with the stages of science learning?	√			
7			Do the steps in the guidebook refer to the learning objectives of improving	√			

No	Variable	Sub Variable	Indicator	Assessment			
				4	3	2	1
			children's scientific literacy?				
8		Balance of picture and text proportions	Is the readability of the material representative for the guidebook?	√			
9		Interest or attention	Does the material in the Little Scientist guidebook motivate teachers to learn and understand scientific literacy activities?		√		
10		Suitability with guidebook elements	Is it in line with the stages of learning scientific literacy?	√			
11			Is the content aspect of the guidebook complete? (learning objectives, material content)	√			

Walker & Hess (inside Arsyad 2013:219)

C. Comment and Suggestion

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D. Conclusion

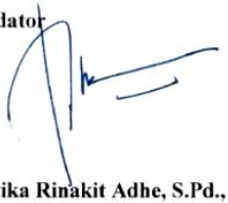
Based on the assessment above, the Little Scientist Guidebook is declared:

5. The Little Scientist Guidebook is valid without any revisions.
6. The Little Scientist Guidebook is valid with minor revisions.
7. The Little Scientist Guidebook is valid without any revisions.
8. The Little Scientist Guidebook is valid without any revisions.

*) Please circle one of them.

Surabaya, May 16 2023

Validator



Kartika Rinakit Adhe, S.Pd., M.Pd.

NIP. 199006152015042002

Appendix 4

Pretest Result

PRETEST ASSESSMENT SHEET

No	Name	Assessment Criteria																				Total
		Capable to explain natural phenomena in a simple manner.				Capable of performing experiments using safe tools and materials for simple experiments.				Demonstrates comprehension of basic scientific concepts.				Displays a significant interest and curiosity towards the surrounding world, particularly in the context of science.				Exhibits a sense of responsibility when using scientific tools and materials, ensuring safety.				
		4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1	
1.	Aisyah			√			√				√					√				√		
2.	Praja			√				√					√			√				√		
3.	Kanzia		√					√			√					√				√		
4.	faris			√				√				√				√				√		
5.	Hashif		√				√				√				√					√		
6.	naswa			√				√				√				√				√		
7.	Rasky			√			√					√				√			√			
8.	Kinan		√					√			√					√				√		
9.	Mizan				√			√				√				√				√		
10.	Ikhsan			√				√				√				√				√		
11.	Nadin			√				√				√				√			√			
12.	Naura		√				√				√				√					√		
13.	Elen		√				√				√				√					√		
14.	Icha				√				√				√				√			√		
15.	Eza			√				√				√				√					√	
16.	Nazia			√				√				√				√				√		
17.	Ahnaf				√				√			√				√			√			

Appendix 5

Post test Result

POST TEST ASSESSMENT SHEET

No	Name	Assessment Criteria																				Total
		Capable to explain natural phenomena in a simple manner.				Capable of performing experiments using safe tools and materials for simple experiments.				Demonstrates comprehension of basic scientific concepts.				Displays a significant interest and curiosity towards the surrounding world, particularly in the context of science.				Exhibits a sense of responsibility when using scientific tools and materials, ensuring safety.				
		4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1	
1.	Aisyah		√			√				√				√					√			
2.	Praja		√			√					√				√			√				
3.	Kanzia		√				√				√				√				√			
4.	faris		√			√					√				√			√				
5.	Hashif	√				√					√				√			√				
6.	naswa		√				√			√				√					√			
7.	Rasky	√				√					√				√			√				
8.	Kinan	√					√			√				√					√			
9.	Mizan		√			√					√			√					√			
10.	Ikhsan		√				√				√			√				√				
11.	Nadin		√			√				√				√				√				
12.	Naura	√					√			√				√				√				
13.	Elen	√				√				√				√					√			
14.	Icha		√				√				√				√				√			
15.	Eza		√				√				√				√				√			
16.	Nazia		√				√				√				√				√			
17.	Ahnaf		√			√					√				√			√				

Appendix 6

Reliability Test Documentation






Appendix 7

Pretest Documentation






Appendix 8

Treatment Documentation

Treatment 1




Treatment 2



Treatment 3

Appendix 9

Post test Documentation






Appendix 10

Little Scientist Guidebook

literasi Sains dan Pembelajarannya

A. Hakikat Sains

Berbagai definisi yang muncul terkait kita menggambarkan sains. Secara umum, sains dapat didefinisikan sebagai pengetahuan yang didasarkan pada metode ilmiah. Namun, dalam pengertian yang lebih praktis, sains sering disebut sebagai Ilmu Pengetahuan Alam (IPA), meskipun pandangan ini sebenarnya salah. Sains berasal dari istilah "natural science" atau "science" dalam bahasa Inggris, yang merujuk pada ilmu pengetahuan alam seperti fisika, kimia, dan biologi, serta ilmu lain yang serupa seperti geologi dan astronomi. Sains adalah bidang studi yang berfokus pada penjelasan fenomena alam dan interaksinya, termasuk interaksi antara materi dan energi, serta mempelajari komponen biotik dan abiotik.

Sains untuk anak usia dini dapat diajarkan melalui pendekatan yang menyenangkan dan interaktif yang bertujuan untuk memperkenalkan anak-anak pada konsep-konsep sains dasar dan membangun rasa ingin tahu mereka terhadap dunia di sekitar mereka. Berikut adalah beberapa pendekatan yang efektif untuk mengajarkan sains kepada anak usia dini

2

PENGERTIAN LITERASI SAINS ANAK

Literasi sains merupakan pengetahuan tentang konsep dan kemampuan untuk menginvestigasi pertanyaan, menganalisis informasi baru, menjelaskan fenomena ilmiah, menerbitkan kesimpulan berdasarkan fakta, memahami karakteristik sains, kesadaran akan pengaruh sains dan teknologi pada lingkungan alam, intelektual, dan budaya, keinginan untuk terlibat dan peduli pada isu-isu yang terkait dengan sains.

CAPAIAN LITERASI SAINS ANAK

1. Anak mampu menjelaskan fenomena alamiah secara sederhana.
2. Anak mampu melakukan percobaan dengan menggunakan alat dan bahan yang aman untuk melakukan percobaan sederhana.
3. Anak mampu memahami konsep sains sederhana.
4. Anak dapat menunjukkan sikap ingin tahu yang besar terhadap dunia di sekitarnya, termasuk dalam hal sains.
5. Anak dapat menunjukkan keunggulan positif dalam menggunakan alat dan bahan yang secara aman.

No	Nama siswa	Aspek yang dinilai																	
1																			
2																			
3																			
4																			

LANGKAH-LANGKAH PEMBELAJARAN LITERASI SAINS

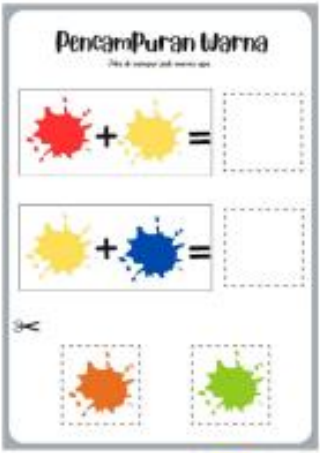
1. Tahap Kontak
2. Tahap Kuriositi
3. Tahap Pembentukan Konsep
4. Tahap Pengambilan Keputusan
5. Tahap Pengembangan Konsep
6. Tahap Evaluasi

AIR WARNA BERJALAN

ALAT & BAHAN

1. 5 Gelas plastik transparan
2. Tissue dapur
3. Pewarna makan (Merah, Kuning,Biru)
4. Air

No	Tujuan	Indikator	Level	Aspek Kognitif Berdasarkan Level
1	Air Kanji Berubah	Anak mampu mengidentifikasi perubahan setelah	M1	Anak mampu mengidentifikasi perubahan setelah secara sederhana pada anak mampu secara mengamati perubahan
			M2	Anak mampu mengidentifikasi perubahan setelah secara sederhana pada anak mampu secara mengamati perubahan
			M3	Anak mampu mengidentifikasi perubahan setelah secara sederhana pada anak mampu secara mengamati perubahan secara dengan bahasa yang mudah dipahami dengan bantuan.
			M4	Anak belum mampu mengidentifikasi perubahan setelah secara sederhana pada anak belum mampu mengamati perubahan secara dengan bahasa yang mudah dipahami.
		Anak mampu menjelaskan perubahan dengan menggunakan alat dan bahan yang ada untuk melakukan percobaan sederhana	M1	Anak mampu menjelaskan perubahan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan kata-kata sendiri untuk melakukan percobaan sederhana.
			M2	Anak mampu menjelaskan perubahan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan kata-kata sendiri untuk melakukan percobaan sederhana.
			M3	Anak mampu menjelaskan perubahan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan contoh sederhana untuk melakukan percobaan sederhana.
			M4	Anak belum mampu menjelaskan perubahan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan contoh sederhana untuk melakukan percobaan sederhana.
		Anak mampu menyebutkan	M1	Anak mampu menyebutkan hasil percobaan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan kata-kata sendiri untuk melakukan percobaan sederhana.
			M2	Anak mampu menyebutkan hasil percobaan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan kata-kata sendiri untuk melakukan percobaan sederhana.
			M3	Anak mampu menyebutkan hasil percobaan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan contoh sederhana untuk melakukan percobaan sederhana.
			M4	Anak belum mampu menyebutkan hasil percobaan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan contoh sederhana untuk melakukan percobaan sederhana.
		Anak mampu menyebutkan	M1	Anak mampu menyebutkan hasil percobaan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan kata-kata sendiri untuk melakukan percobaan sederhana.
			M2	Anak mampu menyebutkan hasil percobaan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan kata-kata sendiri untuk melakukan percobaan sederhana.
			M3	Anak mampu menyebutkan hasil percobaan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan contoh sederhana untuk melakukan percobaan sederhana.
			M4	Anak belum mampu menyebutkan hasil percobaan dengan menggunakan alat dan bahan yang sesuai untuk dengan bagi anak dengan contoh sederhana untuk melakukan percobaan sederhana.


PencampuranWarna
SCAN ME


Hijau
hijau
Lingkari benda yang berwarna hijau
SCAN ME

Appendix 11

Daily Lesson Plan for Pretest

DAILY LESSON IMPLEMENTATION PLAN
TK 'AISYIYAH 57 SURABAYA

Theme: Natural Phenomena
Sub-theme: Water
Semester: 2 (One)
Week: XII
Day/Date: Friday, May 19, 2023
Group: A4
Center: Natural Materials Center
Core Competencies: KI-1, KI-2, KI-3, KI-4
Basic Competencies: 1.1, 3.1/4.1, 3.3/4.3, 2.5, 2.6, 3.3/4.3, 3.11/4.11, 3.12/4.12, 3.15/4.15

Subject Matter:
- Muscle stretching/simple gymnastics
- Daily prayers
- Living a healthy life (health protocols)
- Q&A about water
- Analyzing the uses of water
- Completing assignments
- Reading books according to the volume
- Learning color mixing using a poster

Learning Objectives:
- Children can perform muscle stretching/simple gymnastics
- Children pray daily
- Children can live a healthy life (health protocols)
- Children can ask and answer questions about water
- Children can analyze the uses of water
- Children can complete assignments
- Children can read books according to the volume
- Children can conduct a color walking water experiment
- Learning color mixing using a poster

Pre-learning Activities:
Foundation for arranging the main environment

- Activities outside the class: children wash hands and check temperature
  Children do muscle stretching/simple gymnastics
- Activities inside the class: the teacher prepares the equipment and play materials to be used according to today's plan

Early Activities (07.00 – 07.15)

- **Foundation before entering the class greeting (07.00-07.15)**
  The teacher welcomes the children at the school gate with a smile and informs them to wash hands and check temperature
- **Opening (07.15 – 07.30)**
  In the class yard, the teacher invites the children in front of the school gate with a smile
- **Children enter the class to pray together (07.30-08.15)**
  Reading short letters and daily prayers and hadith
- **Morning material (08.15-09.15)**
  Children are asked questions about color mixing
  Reading books according to the volume
- **Meal Break (09.00 - 09.30)**
  - Reading a prayer for eating, washing hands, eating and drinking, prayer after eating
  - Transition to the CORE activity

Core Activity (09.30 – 10.45)

- **Experience-based foundation before playing (09.30-09.40)**
  - Talking about today's activities (related to the theme), for example:
    - Can children ask and answer questions about color mixing?
    - Can children obey the rules of the game?
    - Can children do their tasks on their own?
  - The teacher explains to the children about today's activities

        - Learning color mixing using a poster
    - The teacher conveys the rules of the game and selects friends to play in the center, reminding children to return all play tools to their places when finished
    - The teacher allows children to play according to the agreed-upon rules.

- **Experience-based foundation while playing (09.40 – 10.40)**
    - Children participate in center activities
    - The teacher oversees and ensures that all children participate in the activities
    - Providing assistance to children who are not yet independent
    - Recording the results of children's activities during play
    - Children help tidy up the tools used in center activities

- **Experience-based foundation after playing (10.40 – 10.45)**
    - The teacher ensures that the activity tools have returned to their place
    - Children sit in their places; the teacher recalls today's activities
    - Giving rewards such as applause to children who participated well today

Closing Activities (10.45 – 11.00)
- Children sit in their places (in a circle), and the teacher invites them to prepare for the home prayer
- The teacher announces the plan for tomorrow's activities
- Praying after the activity and going home

Assessment Method:
Giving Assignments
Artifacts
Anecdotes

Learning Tools: Poster

Daily Lesson Plan for Treatment 1

DAILY LESSON IMPLEMENTATION PLAN
TK 'AISYIYAH 57 SURABAYA

Theme: Beverages
Sub-theme: Ice Cream
Semester: 2 (Two)
Week: XII
Day/Date: Monday, May 22, 2023
Group: A4
Center: Natural Materials Center
Core Competencies: KI-1, KI-2, KI-3, KI-4
Basic Competencies: 1.1, 3.1/4.1, 3.3/4.3, 2.5, 2.6, 3.3/4.3, 3.11/4.11, 3.12/4.12, 3.15/4.15

Subject Matter:
- Muscle stretching/simple gymnastics
- Daily prayers
- Living a healthy life (health protocols)
- Q&A about favorite drinks
- Analyzing the uses of favorite drinks
- Completing assignments
- Reading books according to the volume
- Making ice cream spin

Learning Objectives:
- Children can perform muscle stretching/simple gymnastics
- Children pray daily
- Children can live a healthy life (health protocols)
- Children can ask and answer questions about their favorite drinks
- Children can analyze the uses of their favorite drinks
- Children can complete assignments
- Children can read books according to the volume
- Children can make ice cream spin

Pre-learning Activities:
Foundation for arranging the main environment

- Activities outside the class: children wash hands and check temperature
  Children do muscle stretching/simple gymnastics
- Activities inside the class: the teacher prepares the equipment and play materials to be used according to today's plan

Early Activities (07.00 – 07.15)

- **Foundation before entering the class greeting (07.00-07.15)**
  The teacher welcomes the children at the school gate with a smile and informs them to wash hands and check temperature
- **Opening (07.15 – 07.30)**
  In the class yard, the teacher invites the children in front of the school gate with a smile
- **Children enter the class to pray together (07.30-08.15)**
  Reading short letters and daily prayers and hadith
- **Morning material (08.15-09.15)**
  - Children are asked questions about their favorite drinks
  - Reading books according to the volume
- **Meal Break (09.00 - 09.30)**
  - Reading a prayer for eating, washing hands, eating and drinking, prayer after eating
  - Transition to the CORE activity

Core Activity (09.30 – 10.45)

- **Experience-based foundation before playing (09.30-09.40)**
  - Talking about today's activities (related to the theme), for example:
    - Can children ask and answer questions about their favorite drinks?
    - Can children obey the rules of the game?
    - Can children do their tasks on their own?
  - The teacher explains to the children about today's activities

    - Making ice cream spin
  - The teacher conveys the rules of the game and selects friends to play in the center, reminding children to return all play tools to their places when finished
  - The teacher allows children to play according to the agreed-upon rules.

- **Experience-based foundation while playing (09.40 – 10.40)**
  - Children participate in center activities
  - The teacher oversees and ensures that all children participate in the activities
  - Providing assistance to children who are not yet independent
  - Recording the results of children's activities during play
  - Children help tidy up the tools used in center activities

- **Experience-based foundation after playing (10.40 – 10.45)**
  - The teacher ensures that the activity tools have returned to their place
  - Children sit in their places; the teacher recalls today's activities
  - Giving rewards such as applause to children who participated well today

Closing Activities (10.45 – 11.00)
- Children sit in their places (in a circle), and the teacher invites them to prepare for the home prayer
- The teacher announces the plan for tomorrow's activities
- Praying after the activity and going home

Assessment Method:
Giving Assignments
Artifacts
Anecdotes

Learning Tools: Can, ice cubes, salt, and basin

Daily Lesson Plan for Treatment 2

DAILY LESSON IMPLEMENTATION PLAN
TK 'AISYIYAH 57 SURABAYA

Theme: Healthy Living
Sub-theme: I Like Kangkung Vegetables
Semester: 2 (One)
Week: XII
Day/Date: Wednesday, April 5, 2023
Group: A4
Center: Natural Materials Center
Core Competencies: KI-1, KI-2, KI-3, KI-4
Basic Competencies: 1.1, 3.1/4.1, 3.3/4.3, 2.5, 2.6, 3.3/4.3, 3.11/4.11, 3.12/4.12, 3.15/4.15

Subject Matter:
- Muscle stretching/simple gymnastics
- Daily prayers
- Living a healthy life (health protocols)
- Q&A about kangkung vegetables
- Analyzing the uses of kangkung vegetables
- Completing assignments
- Reading books according to the volume
- Planting kangkung vegetables
- Picking kangkung vegetables
- Rolling kangkung stems

Learning Objectives:
- Children can perform muscle stretching/simple gymnastics
- Children pray daily
- Children can live a healthy life (health protocols)
- Children can ask and answer questions about kangkung vegetables
- Children can analyze the uses of kangkung vegetables
- Children can complete assignments
- Children can read books according to the volume
- Children can plant kangkung vegetables

- Children can pick kangkung vegetables
- Children can roll kangkung stems

Pre-learning Activities:
Foundation for arranging the main environment

- Activities outside the class: children wash hands and check temperature
  Children do muscle stretching/simple gymnastics
- Activities inside the class: the teacher prepares the equipment and play materials to be used according to today's plan

Early Activities (07.00 – 07.15)

- **Foundation before entering the class greeting (07.00-07.15)**
  The teacher welcomes the children at the school gate with a smile and informs them to wash hands and check temperature
- **Opening (07.15 – 07.30)**
  In the class yard, the teacher invites the children in front of the school gate with a smile
- **Children enter the class to pray together (07.30-08.15)**
  Reading short letters and daily prayers and hadith
- **Morning material (08.15-09.15)**
  - Children are asked questions about kangkung vegetables
  - Reading books according to the volume
- **Meal Break (09.00 - 09.30)**
  - Reading a prayer for eating, washing hands, eating and drinking, prayer after eating
  - Transition to the CORE activity

Core Activity (09.30 – 10.45)

- **Experience-based foundation before playing (09.30-09.40)**
  - Talking about today's activities (related to the theme), for example:
    - Can children ask and answer questions about kangkung vegetables
    - Can children obey the rules of the game?

        - Can children do their tasks on their own?
    - The teacher explains to the children about today's activities
        - Planting kangkung vegetables
        - Picking kangkung vegetables
        - Rolling kangkung stems
    - The teacher conveys the rules of the game and selects friends to play in the center, reminding children to return all play tools to their places when finished
    - The teacher allows children to play according to the agreed-upon rules.

- **Experience-based foundation while playing (09.40 – 10.40)**
    - Children participate in center activities
    - The teacher oversees and ensures that all children participate in the activities
    - Providing assistance to children who are not yet independent
    - Recording the results of children's activities during play
    - Children help tidy up the tools used in center activities

- **Experience-based foundation after playing (10.40 – 10.45)**
    - The teacher ensures that the activity tools have returned to their place
    - Children sit in their places; the teacher recalls today's activities
    - Giving rewards such as applause to children who participated well today

Closing Activities (10.45 – 11.00)

- Children sit in their places (in a circle), and the teacher invites them to prepare for the home prayer
- The teacher announces the plan for tomorrow's activities
- Praying after the activity and going home

Assessment Method:
Giving Assignments
Artifacts
Anecdotes

Learning Tools: Kangkung plants, tools for planting kangkung, bowl, and string for rolling kangkung stems.

Daily Lesson Plan for Treatment 3

DAILY LESSON IMPLEMENTATION PLAN
TK 'AISYIYAH 57 SURABAYA

Theme: Natural Phenomena
Sub-theme: Volcanic Eruption
Semester: 2 (One)
Week: XII
Day/Date: Wednesday, May 24, 2023
Group: A4
Center: Natural Materials Center
Core Competencies: KI-1, KI-2, KI-3, KI-4
Basic Competencies: 1.1, 3.1/4.1, 3.3/4.3, 2.5, 2.6, 3.3/4.3, 3.11/4.11, 3.12/4.12, 3.15/4.15

Subject Matter:
- Muscle stretching/simple gymnastics
- Daily prayers
- Living a healthy life (health protocols)
- Q&A about rain
- Analyzing the uses of rain
- Completing assignments
- Reading books according to the volume
- Experiment on the process of a volcanic eruption

Learning Objectives:
- Children can perform muscle stretching/simple gymnastics
- Children pray daily
- Children can live a healthy life (health protocols)
- Children can ask and answer questions about rain
- Children can analyze the uses of rain
- Children can complete assignments
- Children can read books according to the volume
- Children can experiment on the process of a volcanic eruption

Pre-learning Activities:
Foundation for arranging the main environment

- Activities outside the class: children wash hands and check temperature
  Children do muscle stretching/simple gymnastics
- Activities inside the class: the teacher prepares the equipment and play materials to be used according to today's plan

Early Activities (07.00 – 07.15)

- **Foundation before entering the class greeting (07.00-07.15)**
  The teacher welcomes the children at the school gate with a smile and informs them to wash hands and check temperature
- **Opening (07.15 – 07.30)**
  In the class yard, the teacher invites the children in front of the school gate with a smile
- **Children enter the class to pray together (07.30-08.15)**
  Reading short letters and daily prayers and hadith
- **Morning material (08.15-09.15)**
  Children are asked questions about volcanic eruption
  Reading books according to the volume
- **Meal Break (09.00 - 09.30)**
  - Reading a prayer for eating, washing hands, eating and drinking, prayer after eating
  - Transition to the CORE activity

Core Activity (09.30 – 10.45)

- **Experience-based foundation before playing (09.30-09.40)**
  - Talking about today's activities (related to the theme), for example:
    - Can children ask and answer questions about volcanic eruption?
    - Can children obey the rules of the game?
    - Can children do their tasks on their own?
  - The teacher explains to the children about today's activities
    - Experiment on the process of a volcanic eruption
  - The teacher conveys the rules of the game and selects

friends to play in the center, reminding children to return all play tools to their places when finished
- The teacher allows children to play according to the agreed-upon rules.

- **Experience-based foundation while playing (09.40 – 10.40)**
  - Children participate in center activities
  - The teacher oversees and ensures that all children participate in the activities
  - Providing assistance to children who are not yet independent
  - Recording the results of children's activities during play
  - Children help tidy up the tools used in center activities

- **Experience-based foundation after playing (10.40 – 10.45)**
  - The teacher ensures that the activity tools have returned to their place
  - Children sit in their places; the teacher recalls today's activities
  - Giving rewards such as applause to children who participated well today

Closing Activities (10.45 – 11.00)
- Children sit in their places (in a circle), and the teacher invites them to prepare for the home prayer
- The teacher announces the plan for tomorrow's activities
- Praying after the activity and going home

Assessment Method:
Giving Assignments
Artifacts
Anecdotes

Learning Tools: Tools for conducting experiments on the process of rain formation, newspapers, buffalo paper.

Daily Lesson Plan for Post test

DAILY LESSON IMPLEMENTATION PLAN
TK 'AISYIYAH 57 SURABAYA

Theme: Natural Phenomena
Sub-theme: Water
Semester: 2 (One)
Week: XII
Day/Date: Thursday, May 25, 2023
Group: A4
Center: Natural Materials Center
Core Competencies: KI-1, KI-2, KI-3, KI-4
Basic Competencies: 1.1, 3.1/4.1, 3.3/4.3, 2.5, 2.6, 3.3/4.3, 3.11/4.11, 3.12/4.12, 3.15/4.15

Subject Matter:
- Muscle stretching/simple gymnastics
- Daily prayers
- Living a healthy life (health protocols)
- Q&A about water
- Analyzing the uses of water
- Completing assignments
- Reading books according to the volume
- Experiment on walking colored water
- Transferring water in a bottle

Learning Objectives:
- Children can perform muscle stretching/simple gymnastics
- Children pray daily
- Children can live a healthy life (health protocols)
- Children can ask and answer questions about water
- Children can analyze the uses of water
- Children can complete assignments
- Children can read books according to the volume
- Children can conduct an experiment on walking colored water
- Children can transfer water in a bottle

Pre-learning Activities:
Foundation for arranging the main environment

- Activities outside the class: children wash hands and check temperature
  Children do muscle stretching/simple gymnastics
- Activities inside the class: the teacher prepares the equipment and play materials to be used according to today's plan

Early Activities (07.00 – 07.15)

- **Foundation before entering the class greeting (07.00-07.15)**
  The teacher welcomes the children at the school gate with a smile and informs them to wash hands and check temperature
- **Opening (07.15 – 07.30)**
  In the class yard, the teacher invites the children in front of the school gate with a smile
- **Children enter the class to pray together (07.30-08.15)**
  Reading short letters and daily prayers and hadith
- **Morning material (08.15-09.15)**
  Children are asked questions about water
  Reading books according to the volume
- **Meal Break (09.00 - 09.30)**
  - Reading a prayer for eating, washing hands, eating and drinking, prayer after eating
  - Transition to the CORE activity

Core Activity (09.30 – 10.45)

- **Experience-based foundation before playing (09.30-09.40)**
  - Talking about today's activities (related to the theme), for example:
    - Can children ask and answer questions about color mixing?
    - Can children obey the rules of the game?
    - Can children do their tasks on their own?
  - The teacher explains to the children about today's

activities
    - Walking colored water
    - Transferring water in a bottle
    - Making jellyfish creations
- The teacher conveys the rules of the game and selects friends to play in the center, reminding children to return all play tools to their places when finished
- The teacher allows children to play according to the agreed-upon rules.

- **Experience-based foundation while playing (09.40 – 10.40)**
    - Children participate in center activities
    - The teacher oversees and ensures that all children participate in the activities
    - Providing assistance to children who are not yet independent
    - Recording the results of children's activities during play
    - Children help tidy up the tools used in center activities

- **Experience-based foundation after playing (10.40 – 10.45)**
    - The teacher ensures that the activity tools have returned to their place
    - Children sit in their places; the teacher recalls today's activities
    - Giving rewards such as applause to children who participated well today

Closing Activities (10.45 – 11.00)
- Children sit in their places (in a circle), and the teacher invites them to prepare for the home prayer
- The teacher announces the plan for tomorrow's activities
- Praying after the activity and going home

Assessment Method:
Giving Assignments
Artifacts
Anecdotes

Learning Tools: Bottles, sponges, glasses, water, food coloring, and tissues