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Jurnal Penelitian dan Pengembangan Pendidikan
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Vol. 11 No. 4 : October 2024
E-ISSN: 2722-4627
pp. 750-763

Innovation of Learning Tools Based on the Caplaire Model to Improve Scientific Literacy Skills

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Abstract: This research aims to produce a Student Worksheet based on the Caplaire Model to improve scientific literacy skills for Elementary School Teacher Education students that is valid, practical, and effective. This research is development research using the ADDIE model which includes 5 stages, namely: Analyze, Design, Development, Implementation, and Evaluation. The research instruments used in product development consist of material expert validation and design expert validation instruments, student response questionnaire instruments to products, and product effectiveness test question instruments. The data analysis technique used in this research was quantitative and qualitative descriptive data analysis. The research results obtained were: 1) The results of the material expert validation test using the material expert validation instrument obtained a score of 84% with a very feasible category; 2) The results of the design expert validation test using the design expert validation instrument obtained a score of 86% with a very feasible category; 3) The results of the practicality test using the lecturer response questionnaire instrument obtained a score of 85% in the very practical category; 4) The results of the effectiveness test using question instruments for students showed an increase in scores in the initial test and final test, in the initial test the average score was 60.8 and in the final test the average score was 82.8. So, through this development research, student worksheets based on the Caplaire Model were obtained that were valid, practical, and effective.

Article History
Received: 11-08-2024
Revised: 16-09-2024
Accepted: 29-09-2024
Published: 21-10-2024

Key Words:
Caplaire Model;
Scientific Literacy;
Student Worksheets.

How to Cite: Ananda, L., Simanihuruk, L., & Zati, V. (2024). Innovation of Learning Tools Based on the Caplaire Model to Improve Scientific Literacy Skills. *Jurnal Paedagogy, 11*(4), 750-763. doi:https://doi.org/10.33394/jp.v11i4.12623

https://doi.org/10.33394/jp.v11i4.12623

Introduction

Scientific literacy is defined by the Organization for Economic Cooperation and Development (OECD) (2019) as the capacity to recognize questions, generate new knowledge, offer scientific explanations, draw conclusions based on scientific evidence, and cultivate a reflective mindset to contribute to the resolution of science-related problems and concepts (OECD, 2019). The OECD breaks down scientific literacy skills into three main categories: 1) Capable of providing a scientific explanation for phenomena; 2) Capable of assessing and planning scientific research; and 3) Capable of providing a scientific interpretation of facts and evidence. To comprehend the environment, health, economics, and society, students and aspiring teachers must possess scientific literacy abilities (Yulistina, 2023).

From the student's perspective, scientific literacy is related to how students can understand the environmental conditions in which they live and the problems that exist in society, which are dependent on technology and the advancement of science or knowledge (Hasnawati et al, 2023). Meanwhile, from the standpoint of instructors (prospective teachers), teachers must also have scientific literacy abilities, even if it means incorporating scientific

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E-ISSN: 2722-4627
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literacy activities into the learning process so that their pupils are indirectly taught scientific literacy. According to Syaodih et al. (2021), scientific literacy skills are vital for instructors because they allow teachers to determine appropriate learning for students' capacities.

The 2022 PISA results show that Indonesia experienced a decline in the 3 literacy assessment categories, and is still below the average score set by the OECD. The standard score set by the OECD for Mathematics is 472, Reading 476, and Science 485. Indonesia's score for Mathematics is 366, Reading 359, and Science 383. Indonesia in the field of Mathematics literacy is ranked 12th in the bottom, reading literacy is ranked 11th in the bottom, and science is ranked in the bottom 15 of 81 countries participating in PISA 2022. (Nurmuhaemin, 2023). The ranking is still quite far compared to other countries. These results certainly need special attention from universities, especially PGSD study programs, to try to improve scientific literacy skills and also the ability to design learning based on scientific literacy for prospective elementary school teachers.

In 2023, analysts created a logical literacy-based learning demonstration called the Caplaire Show, which is a shortened form for the steps within the show, to be specific 1) Case Examination, 2) Arrange A Arrangement, 3) Usage, and 4) Reflection/Evaluation. This learning demonstrate was created with the point of moving forward the logical literacy skills of understudies within the Medan State College basic school educator instruction ponder program as well as being utilized as an elective learning step that can be utilized when carrying out learning in basic schools (Ananda, L., Simanihuruk, L., Ratno, S., & Zati, V., (2024). In this year's inquiry, researchers tried to create a learning apparatus plan within the shape of understudy worksheets that can be utilized within the learning preparation. The understudy worksheet created was adjusted to the steps within the Caplaire Demonstrate. Typically critical to do considering that in the past inquiries about the Caplaire learning demonstration based on logical literacy were created, but for its application within the learning preparation, understudy worksheets are required that are adjusted to the stages of the Caplaire show so that most objectives of creating this demonstrate can be accomplished, specifically expanding students' logical education aptitudes.

The common point of this investigation is to create learning apparatuses within the frame of understudy worksheets based on the Caplaire Show for Basic School Teacher Instruction understudies within the Fundamental Science Concepts Course. In the interim, the particular point of this inquire about is to depict the legitimacy, common sense and adequacy of understudy worksheets based on the Caplaire Demonstrate to make strides logical literacy skills for Basic School Educator Instruction understudies within the Fundamental Concepts of Science course.

Research Method

This research is of the Research and Development type, where a student worksheet based on the Caplaire model was developed to improve the scientific literacy skills of students in the elementary school teacher education study program. The method of development used the ADDIE model, which is one of the systematic instructional design models. According to Dick, W & Carey, L., ADDIE models consist of five steps: (1) Analyze; (2) Design; (3) Development; (4) Implementation; and (5) Evaluation. (Dick & Carey 1996). With detailed stages as follows:

1) Analysis Stage
   This analysis stage is carried out to determine student learning needs and identify problems. Analysis is needed to determine the worksheet design that will be developed

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using the Caplaire model. At this stage there are three stages of activities, namely, curriculum analysis, concept analysis and student needs analysis.

2) Design Stage
   The design stage is the stage of designing student worksheets based on the Caplaire model.
3) Development Stage
   At the development stage, the Caplaire model-based learning device design that has been carried out in the previous stage will be realized into a product that is ready to be implemented. Some of the activities that will be carried out at this development stage are validating the Caplaire model-based learning tools that have been designed, namely validation in the material and design aspects. After the validation process is carried out, product revisions are carried out so that at the final stage of development a valid Caplaire model-based student worksheet will be produced.
4) Implementation Stage
   This organization may be a trial organization carried out to begin with semester understudies who have diverse capacities, specifically understudies with tall, medium, and moo capacities. It organizes points to decide the viability of learning apparatuses based on the Caplaire model in progressing students' logical education abilities. Typically done through the learning preparation and evaluating students' logical education capacities through the questions given.
5) Evaluation Stage
   In the final stage, an evaluation is carried out. The evaluation was carried out to measure the level of development success, development obstacles, and the impact of implementing learning tools based on the Caplaire model on students' scientific literacy abilities as prospective elementary school teachers. The evaluation carried out is an evaluation of development results.

This research was conducted in the Medan State University primary school teacher education study program with a research period of 11 months, starting from January to November 2024. The population in this study was all first-semester students of the Medan State University primary school teacher education study program, totaling 380 students. The research sample was 100 students. The sampling technique used was purposive sampling providing an assessment of who should be involved in the research. There are 3 variables in the research, namely: validity, practicality, and effectiveness of student worksheets based on the Caplaire model as an effort to improve the scientific literacy skills of elementary school teacher education students in the Basic Biology Concepts course as well as being able to design science-based learning in elementary schools.

This research may be a trial organized to begin with semester understudies who have diverse capacities, specifically understudies with tall, medium, and moo capacities. This study points to the viability of learning apparatuses based on the Caplaire model in progressing students' logical education abilities. Typically done through the learning preparation and evaluating students' logical education capacities through the questions given. The information investigation procedure utilized in this inquiry is quantitative and subjective graphic information investigation. Master tests and little gathered test information from surveys were analyzed in rates and clarified subjectively. Field test/user test information within the form of learning forms within the advancement environment are analyzed utilizing streams that demonstrate subjective information examination by applying multipurpose standards. Investigation exercises incorporate information diminishment, information

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introduction, and drawing conclusions or confirmation. Information decrease exercises incorporate classification and coding agreeing to the sort of information (Miles, Huberman, & Saldana, J. (2014). Introduction of information within the frame of depictions, tables, charts, pictures, or other visual shapes. The information that has been displayed is confirmed, translated, and concluded.

Results and Discussion

This research is a continuation of research in the previous year. In 2023 researchers developed a learning model called the Caplaire Learning Model based on scientific literacy. This learning model was developed based on the needs of the learning process in the Basic Concepts of Biology course which focuses on strengthening students' scientific literacy skills. This learning model can also be used by prospective elementary school teachers to be applied to elementary school students. In 2024 researchers will continue the research process by developing an integrated learning tool with the Caplaire Model. The learning tools developed are student worksheets. The following is an explanation of the research results from each stage of ADDIE.

1) Analysis Stage

The examination arrangement is carried out to decide understudy learning needs and recognize issues. At this organize there are three stages of movement, specifically, educational programs investigation, concept investigation, and understudy need examination, as clarified underneath (a) Educational modules investigation, to specifically analyzing learning results for the Essential Science Concepts course based on the educational programs, (b) Concept investigation is carried out to discover out the most concepts that must be faced by understudies within the Fundamental Concepts of Science course, (c) Analysis of student needs is carried out to decide understudy characteristics and the have to be ace logical education aptitudes. The following is an explanation of the results of the analysis stages that have been carried out:

a) Curriculum Analysis

The investigation into the educational modules aims to outline the course learning outcomes and subject matter within the Essential Science Concepts course. This review was conducted by examining the curriculum guidelines and semester learning plans for the Fundamental Science Concepts course within the Elementary School Teacher Education program at Medan State University. This process generates course learning outcomes and subject matter that can then be presented in student worksheets based on the Caplaire Model. The design of these student worksheets is aligned with the stages of the Caplaire Model, which were developed in previous research, and also conforms to the aspects of scientific education skills that are central to the steps of the Caplaire model. Below is the table of learning outcomes and lecture topics assigned to the Basic Biology Concepts course in the Medan State University Elementary School Teacher Education program.

Table 1. Curriculum analysis results (Learning Outcomes)

Learning Outcomes	
(Learning Outcomes 1)	Demonstrate a responsible attitude towards work in the Basic Concepts of Biology course independently.
(Learning Outcomes 2)	Mastering knowledge about Basic Biology Concepts.
(Learning Outcomes 3)	Mastering knowledge related to the development of science and technology in the field of Biology.

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(Learning Outcomes 4)	Able to apply coherent, basic, efficient and imaginative considering within the setting of creating or executing science and innovation that pays consideration to and applies humanities values in understanding with the field of Science-Biology.
(Learning Outcomes 5)	Able to demonstrate independent, quality and measurable performance in the Basic Concepts of Biology course.
(Learning Outcomes 6)	Able to make appropriate decisions in the context of solving problems in the field of Science-Biology, based on the results of information and data analysis.
(Learning Outcomes 7)	Able to form suitable choices within the setting of understanding issues within the field of Science-Biology, based on the comes about of data and information examination.

Table 2. Curriculum analysis results (Main/Sub-topic)

Subject	Sub Topic
1. Scope of Biology	a. Definition and Scope of Biology b. Scientific Method c. Microscopes and their uses d. Work Safety in the Laboratory
2. Organization of Life	a. Cell b. Tissue c. Organs and Organ Systems
3. Classification of Organism	a. Characteristics of Organism b. Dasar-dasar Klasifikasi Makhluk Hidup
4. Photosynthesis and Transport Systems in Plants	a. Respiration b. Photosynthesis c. Transport Systems in Plants
6. Animal Body Parts and Animal Breeding	a. Animal Body Parts b. Animal Breeding
7. Human Body Structure	a. Human Body Structure b. Organ Systems in Human
8. Genetics	a. Genetic Definition b. Process of Inheritance
9. Ecosystems	a. Ecosystems Definition b. Types of Ecosystems
10. Water Cycle	a. Components of The Water Cycle b. Water Cycle Process

b) Concept Analysis

Concept analysis was conducted to understand the concepts behind the learning tools being developed. In this research, a student worksheet learning tool was created. The developed student worksheet followed the stages of the Caplaire model, which had been established in previous research. The Caplaire model is a learning framework designed to promote scientific literacy. It aims to provide students with a learning environment rich in scientific literacy activities, fostering the development of scientifically literate individuals. "Caplaire" itself is an acronym for Case Investigation, Plan A Solution, Implementation, and Reflection/Evaluation.

Additionally, scientific literacy skills are a key concept in the development of student worksheets. In line to enhance students' scientific literacy abilities, the development of

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evaluation and assessment instruments also adheres to the principles of scientific literacy. A scientifically literate individual is characterized by the following three aspects (OECD, 2019):

1). Able to explain phenomena scientifically
2). Able to evaluate and design scientific investigations
3). Able to interpret scientific data and evidence

To classify scientific proficiency capacities, seven indicators are used to determine scientific literacy abilities. These seven indicators refer to the metrics of scientific literacy developed by Gormally et al. (2012). The seven dimensions of scientific literacy indicators are: (1) Recognizing valid scientific conclusions; (2) Conducting effective literature searches; (3) Understanding the components of research designs and how they affect findings/conclusions; (4) Creating appropriate charts from data; (5) Solving problems using quantitative skills, including basic statistics; (6) Understanding and interpreting basic statistics; and (7) Making inferences, predictions, and drawing conclusions based on quantitative data. The indicators of scientific literacy developed by Gormally et al. (2012: 365) were selected because they are straightforward, easy to implement, and accurately reflect scientific literacy abilities. Furthermore, these indicators align with three scientific competencies measured in scientific literacy. Being able to assess and plan scientific investigations corresponds to indicator 1, explaining phenomena scientifically relates to indicators 2 to 6, and interpreting data and scientific evidence corresponds to indicator 7.

c) Analysis of Student Needs

The analysis of student needs was conducted to determine the learning requirements of students in the Elementary School Teacher Education study program, particularly in the Basic Concepts of Biology course. In previous research, a Caplaire learning model based on scientific literacy was developed and used in the learning process for Basic Biology Concepts. To ensure the effectiveness and achievement of the primary objective of this model—namely, enhancing students' scientific literacy skills—it is essential to develop learning tools that are integrated with the Caplaire model. The learning tools to be developed will be student worksheets that incorporate the Caplaire model.

2) Design Stage

The plan is to organize learning gadgets based on the Caplaire demonstration. Plan of learning instruments within the shape of understudy worksheets based on logical education utilizing the Caplaire show which is expected for the Essential Science Concepts course for Basic School Instructor Education students. The understudy worksheet created takes after the steps within the Caplaire learning demonstration.

Student worksheets are used as a tool to help students practice new skills, review material, or organize information. The design of this worksheet is structured following the characteristics of the Caplaire learning model, namely based on scientific literacy. This worksheet also helps students hone their scientific literacy skills and is used during the learning process to complete tasks given during lectures which at the end of the activity will produce a product.

Based on the learning steps in the Caplaire model, where there are 4 steps, the first step is Case Investigation. In this first step, students identify problems related to the discussion topics raised in learning or identify problems related to the environment, then investigate the causes and impacts of these problems. The following is a student worksheet design based on the first step in the Caplaire learning model:

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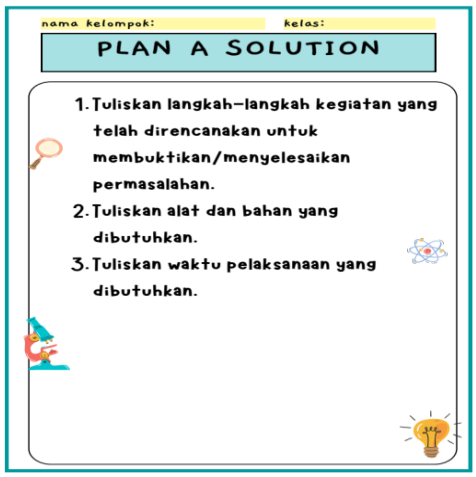
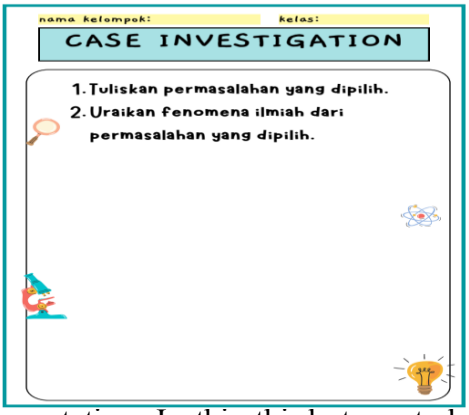


Next, the second step is Plan A Solution. In this second step, students designed an activity to answer the problems raised in the lesson or students prepared a solution plan that would be carried out to solve the problem. The following is a student worksheet design based on the second step in the Caplaire learning model:



Next, the third step is Implementation. In this third step, students carried out the activity design that was planned in the previous step to answer the problem or students carried out the planned solution, producing a product. The following is a student worksheet design based on the third step in the Caplaire learning model:

Next, the fourth step is Reflection/Evaluation. In this fourth step, students reflected and evaluated the solutions that had been implemented and the products that had been produced. The following is a student worksheet design based on the fourth step in the Caplaire learning model:

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3) Development Stage

At the stage of developing student worksheets based on the Caplaire model which has been carried out in the previous stage will be realized into a product that is ready to be implemented. Some of the activities carried out at this development stage were validating the Caplaire model-based learning tools that had been designed, namely validation in the material and design aspects. After the validation process was carried out, product revisions were carried out so that at the final stage of development a valid Caplaire model-based innovative learning tool would be produced. Fabric master approval may be a step taken to test the fabric legitimacy of the item delivered. In this investigation, fabric master approval was carried out on student worksheets created based on the steps within the Caplaire learning show. Fabric master approval was carried out employing a fabric master approval survey and surveyed by fabric specialists. Based on the results of the fabric master approval survey, it is known that the fabric master approval comes about on understudy worksheets that appear exceptionally conventional, to be specific 84%.

Plan master approval could be a step taken to test the legitimacy of the plan of the item delivered. In this inquiry about, plan master approval was carried out on student worksheets created based on the steps within the Caplaire learning demonstration. Plan master approval is carried out employing a plan master approval survey and surveyed by the plan master. Based on the comes about of the plan master approval survey, it is known that the comes about of the plan master approval on learning gadget plan appear exceptionally attainable comes about, to be specific 86%. At this stage, the Caplaire model learning tool took the form of student worksheets which have been validated by experts according to their field of expertise, then revised. Revisions are carried out to consider things that are improvements based on comments, suggestions or input, assessments, as well as conducting product trials on students.

4) Implementation Stage

The usage organize is the trial arrangement of the learning apparatuses that have been created and reexamined. The trial was carried out on understudies to begin with the semester of the 2023/2024 scholastic year within the Fundamental Concepts of Science course. This organizes points to decide the viability of learning instruments based on the Caplaire demonstrated in progressing the logical literacy skills of basic school educator instruction understudies. Usually done through the learning preparation and surveying students' logical proficiency capacities through the questions given. At the starting of the learning handle, the teacher began with clarifying the learning demonstration that would be utilized.

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Clarifications are given based on the Address Occasion Unit, the steps of the Caplaire learning show, the Understudy Worksheet utilized and the appraisal that will be carried out at the conclusion of the lesson.

Figure 1. Explanation of the Caplaire model by the lecturer at the beginning of the learning process

5) Evaluation Stage

Assessment could be a preparation to see (assess) whether the learning instruments being created are effective, in understanding with starting improvement expectations or not. The Assessment Arrange is the ultimate step of the ADDIE advancement show. Assessment may be a handle carried out to supply esteem to learning instruments (Trisiana & Wartoyo, 2016). Assessment was carried out with the point of collecting information almost how effective and productive the worksheet created is. This information is planning to progress and culminate worksheets based on the Caplaire learning demonstration to make them more successful and productive.

In this research, an assessment of outcomes was conducted to evaluate student learning results after implementing the learning preparation with the developed learning tools. The assessment was carried out by providing questions based on scientific literacy to the students. The results of the assessment aim to gauge student learning outcomes following the implementation of the learning preparation with the created tools. In this phase, an evaluation of the student worksheets was conducted using the prepared worksheet assessment rubric. The following are the results of the evaluation of student worksheets by group. During the implementation process, there were six groups of students as follows:

Table 3. Scientific Literacy Based Worksheet Assessment Rubric

Aspect	Assessment criteria	Score 1 (Not enough)	Score 2 (Enough)	Score 3 (Good)	Score 4 (Very Good)
Explaining Phenomena Scientifically	Students' ability to explain scientific phenomena using scientific concepts and appropriate terminology .	Explanations are unclear, scientific concepts are not applied or are often wrong. Scientific terminology is not used correctly.	The explanations are clear enough with a basic understanding of scientific concepts, but some errors in the application of scientific concepts or terminology.	Explanations are clear and accurate, scientific concepts are applied correctly, and scientific terminology is generally correct, although there are a few shortcomings.	Explanations are clear and in-depth, scientific concepts are applied appropriately, and scientific terminology is used very well.

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Aspect	Assessment criteria	Score 1 (Not enough)	Score 2 (Enough)	Score 3 (Good)	Score 4 (Very Good)
Evaluating and Designing Scientific Inquiry	The student's capacity to assess existing strategies of logical request and plan tests or thinks about by considering suitable factors, controls, and strategies.	Assessment of strategies and test plan is exceptionally constrained or insufficient, there are numerous blunders in variable distinguishing proof and control.	The assessment and plan are very great with a few mistakes in recognizing factors or controls, the strategies utilized can still be made strides.	The evaluation and design of the experiment were good, variables and controls were identified correctly, and the methods used were appropriate although there were some minor shortcomings.	Assessment and test plan are exceptionally great, variable distinguishing proof and control are exceptionally precise, the strategies utilized are exceptionally fitting and inventive.
Interpreting Data and Scientific Evidence	Students' capacity to analyze information and logical proof and draw pertinent and strong conclusions in a precise way.	Information investigation and elucidation are lacking, conclusions are not backed by information or logical proof.	Information investigation and translation are very great, conclusions are for the most part upheld by the information, but the examination may need profundity or contain a few mistakes.	Data analysis and interpretation are good, conclusions are strongly supported by scientific data and evidence, although there are slight deficiencies in the depth of analysis.	Data analysis and interpretation are excellent, conclusions are very strong and insightful, fully supported by data and scientific evidence with in-depth synthesis.

Table 4. Table of assessment of students' scientific literacy abilities based on worksheet results

No.	Group	Science Literacy Ability 1	Science Literacy Ability 2	Science Literacy Ability 3	Total Score
1.	1	3	3	3	9
2.	2	3	3	4	10
3.	3	4	3	3	10
4.	4	4	3	3	10
5.	5	3	3	4	10
6.	6	4	4	3	11
Total Score		**21**	**19**	**20**	
Average		**3.5 (Good)**	**3.1 (Good)**	**3.3 (Good)**	

Information:
Science Literacy Ability 1: Explaining Phenomena Scientifically
Science Literacy Ability 2: Evaluating and Designing Scientific Inquiry

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Science Literacy Ability 3: Interpreting Data and Scientific Evidence

Based on the table above, it can be seen that the average score for the scientific literacy ability of the student group is at a score of 3 with the description Good. In this inquiry, a learning apparatus based on the Caplaire learning demonstration, which could be an understudy worksheet, was created. The investigative preparation was carried out utilizing the ADDIE improvement demonstration which started with conducting an examination, making an item plan, and carrying out an improvement preparation to get the legitimacy, common sense, and viability of the learning devices created. Understudy worksheets are planned based on the steps the Caplaire demonstrates with the point of building students' logical proficiency abilities. Logical proficiency is additionally one of the characteristics of the items being created. The researcher's point in developing the Caplaire learning show and its learning instruments is to supply learning models and instruments that can be utilized by teachers, particularly in science subjects in an exertion to progress students' logical education aptitudes. It is imperative to progress students' logical education capacities considering that after completing undergrad ponders within the rudimentary school instructor instruction about the program, they will go to basic school to moreover construct basic school students' logical proficiency capacities.

In line with research conducted by Fazilla (2016) entitled Elementary School Teacher Education Students' Scientific Literacy Abilities in Basic Science Concepts Courses, he stated in his research that "Scientific literacy is one of the important aspects that Elementary School Teacher Education students must master because it influences the science learning process at school base". Other researchers also stated that learning should be directed at developing individuals who are scientifically literate. Scientific literacy is very important and a need for every individual because a country's scientific literacy capability is closely related to the economic level of that country. Considering the very important role of teachers in learning, a teacher must have more abilities than others in improving the quality of education. Not only teachers, but prospective elementary school teachers must also have better abilities so that when the time comes to carry out their duties as teachers, they can carry out learning as well as possible (Daniah, 2020). Therefore, elementary school teacher education students need to have in-depth knowledge of science.

The logical education capacities of rudimentary school understudies have an awfully pivotal part in shaping the establishment of their knowledge and aptitudes for the long term. At an early age, understudies are presented with essential science concepts that not as it were offer assistance to them in understanding how the world capacities, but moreover develop critical and explanatory considering aptitudes. Safrizal (2021) expressed "Logical proficiency is one of the 21st century skills needed within the period of mechanical change 4.0. The significance of logical education abilities is accepted to be the proper step in planning for different worldwide competitions that are right now beginning to enter Indonesia. The significance of creating an experimentally proficient society (Logical Proficiency) is multifaceted. To begin with, expanding logical proficiency has been considered a critical technique to support the nation in terms of mechanical and financial improvement; moment, science, and innovation have created and consolidated into people's day-by-day lives with issues such as climate alter, contamination, and accessible vitality assets; third, as the worldwide economy develops and gets to be more coordinates it gets to be progressively imperative to grow and move forward logical proficiency. Science proficiency is vital for understudies to get the environment, well-being, economy, cutting edge social, and innovation. Subsequently, measuring science proficiency is imperative to decide students'

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level of science education in arrange to realize tall or great science education (DS, Y. N., Achmad Hufad, Suroso Mukti Leksono, Tia Latifatu Sadiah, & Aang Solahudin Anwar., 2024).

Scientific literacy empowers understudies to ask questions, collect information, and draw conclusions based on proof, which are vital abilities in fathoming issues. Furthermore, science information permits understudies to apply logical standards in daily life, such as understanding significant natural and well-being issues. Numerous of the understudies conceded they utilize logical information to illuminate issues inside the understudies and indeed in society. A few of the common issues unraveled are debate determination, security issues, marriage issues, and food generation. Critical numbers of the understudies don't fathom scholastic issues utilizing logical information. In any case, few connected their scientific information to unravel monetary issues, lost review, and the need for conceptual understanding. The understudies illuminated the budgetary issue through engagement in cultivating exercises and borrowing; the understudies looking for the assistance of more learned understudies for the need for conceptual understanding; and the intensity to approach the departmental official utilized to resolve missing grades (Kola, A., Opeyemi, B. A., & Olu, A. M., 2020). Logical proficiency could be a rule objective of instruction nearly in each nation. It is generally underlined in science instruction. Science instruction makes a difference in understudies end up more beneficial people with the information they secure by advancing their considering and learning abilities and these abilities offer assistance to people to make strides in their logical education (Özgüç, C. S., & Cavkaytar, A., 2015).

With experimental and observation skills learned through scientific literacy, students not only gain knowledge but also practical skills that are useful in various fields. Ultimately, scientific literacy not only prepares students for advanced education and careers in science and technology but also builds interest and motivation for further scientific exploration. In a world that is increasingly dependent on technology and innovation, scientific literacy at the basic level is the key to preparing future generations who are intelligent and ready to face global challenges. Conceptually, this research explores how Caplaire's model changes the way we understand and support scientific literacy learning. Practically, the implications include the implementation of innovative learning tools that can improve students' scientific literacy skills, enabling more effective and integrated teaching. This could also mean adjustments in curriculum and teacher training to maximize the benefits of the devices. Schools need to synergize with teachers in preparing curriculum, learning tools, learning methods, and models, as well as facilities and infrastructure that support efforts to increase students' scientific literacy so that efforts to foster students' environmental awareness can be achieved optimally (Mursalin, E., & Setiaji, A.B., 2021).

Conclusion

Based on the research results, material expert validation results were 84% (very feasible category) and design expert validation results were 86% (very feasible category), so it can be concluded that student worksheets based on the Caplaire model are very suitable (valid) for use in course learning. Basic Concepts of Biology. Next, based on the results of the practicality test from the aspect of the lecturer in charge of the course, he gave a very good response to this worksheet, and based on the results of the effectiveness test, after assessing the results on the worksheet, the student obtained a score based on the assessment of aspects of scientific literacy at a score of 3 (with good category).

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Recommendation

Implementing the Caplaire model requires sufficient time to design, implement, and evaluate projects or experiments involving students. Depending on the curriculum and course schedule, it can sometimes be difficult to find adequate time slots for these types of activities. Lecturers who implement the Caplaire model need to have sufficient skills and knowledge in science and technology to be able to support students in understanding and applying scientific concepts. Limitations in lecturer skills can be a serious obstacle to the effectiveness of this model. Future researchers can explore variations in the implementation of the Caplaire model in various educational contexts to assess its effectiveness more broadly. Additionally, testing the long-term impact of such tools on science literacy skills and developing more in-depth training strategies for educators could also be an important focus.

References

Ananda, L.J., Dkk. (2023). CAPLAIRE: Model Pembelajaran Inovatif Berbasis Literasi Sains. Bina Guna Press, Medan.

Ananda, L., Simanihuruk, L., Ratno, S., & Zati, V. (2024, August). CAPLAIRE: Learning Model Design Based on Scientific Literation. In Proceedings of the 5th International Conference of Educational Science, ICONSEIR 2023, 30 November 2023, Medan, Indonesia.

Daniah, D. (2020). PENTINGNYA INKUIRI ILMIAH PADA PRAKTIKUM DALAM PEMBELAJARAN IPA UNTUK PENINGKATAN LITERASI SAINS MAHASISWA. PIONIR: JURNAL PENDIDIKAN; Vol 9, No 1 (2020) ; 2549-6611 ; 2339-2495. https://jurnal.ar-raniry.ac.id/index.php/Pionir/article/view/7178

Dick, W., & Carey, L. 1996. The systematic design of instruction (4th ed.). New York: Harper Collins College Publishers

DS, Y. N., Achmad Hufad, Suroso Mukti Leksono, Tia Latifatu Sadiah, & Aang Solahudin Anwar. (2024). SCIENCE LITERACY SKILLS OF ELEMENTARY SCHOOL STUDENTS IN THE INDEPENDENT CURRICULUM. Pendas : Jurnal Ilmiah Pendidikan Dasar; Vol. 9 No. 1 (2024): Volume 09 No. 01 Maret 2024; 3627 - 3633 ; 2548-6950 ; 2477-2143 ; 10.23969/Jp.V9i1. https://journal.unpas.ac.id/index.php/pendas/article/view/12713

Fazilla, S. (Sarah). (2016). Kemampuan Literasi Sains Mahasiswa Pgsd Pada Mata Kuliah Konsep Dasar Sains. Jupendas: Jurnal Pendidikan Dasar. https://www.neliti.com/publications/71316/kemampuan-literasi-sains-mahasiswa-pgsd-pada-mata-kuliah-konsep-dasar-sains

Gormally, C., Peggy B., & Mary L., (2012). Developing a Test of Scientific Literacy Skills (TOLS): Measuring Undergraduates' Evaluation of Scientific Information and Arguments. CBE-Life Sciences Education, 11 (2012), 364-377.

Insani, M. Y. S., & Fitria, Y. (2022). Pencapaian Kompetensi Literasi Sains Mahasiswa Pendidikan Guru Sekolah Dasar dalam Praktik Pembelajaran Daring Berorientasi Masalah. Jurnal Basicedu, 6(5), 8239-8247. https://doi.org/10.31004/basicedu.v6i5.3247

Kemendikbudristek. (2021). Modul Literasi Sains di Sekolah Dasar. Jakarta.

Kola, A., Opeyemi, B. A., & Olu, A. M. (2020). Assessment of Scientific Literacy Skills of College of Education Students in Nigeria. American Journal of Social Sciences and Humanities , 5(1), 207–220. https://hal.science/hal-03980362

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E-ISSN: 2722-4627
pp. 750-763

Latip, A. (2022). PENERAPAN MODEL ADDIE DALAM PENGEMBANGAN MULTIMEDIA PEMBELAJARAN BERBASIS LITERASI SAINS. DIKSAINS : Jurnal Ilmiah Pendidikan Sains; Vol. 2 No. 2 (2022): Juni 2022; 102-108 ; 2775-9253. https://ejournal.unib.ac.id/diksains/article/view/21237

Mursalin, E., & Setiaji, A. B. (2021). Menumbuhkan Kepedulian Lingkungan melalui Literasi Sains: Penggunaan Pendekatan dan Model Pembelajaran yang Efektif. E-Prosiding Seminar Nasional Pendidikan Jurusan Tarbiyah FTIK IAIN Palangka Raya; Vol 1, No 1 (2021). https://e-proceedings.iain-palangkaraya.ac.id/index.php/SNPJTFTIK/article/view/696

Nurhayati, Y., Sopandi, W., & Riandi, R. (2023). Scientific Literacy Profile of Pre-Service Elementary School Teacher Students. Jurnal Penelitian Pendidikan IPA, 9(7), 5474-5480. https://doi.org/10.29303/jppipa.v9i7.3510

Miles, M.B, Huberman, A.M, & Saldana, J. (2014). Qualitative Data Analysis, A Methods Sourcebook, Edition 3. USA: Sage Publications. Terjemahan Tjetjep Rohindi Rohidi, UI-Press.

OECD. (2019). PISA 2018 Assessment and Analytical Framework. PISA. OECD Publishing. Paris. DOI: https://doi.org/10.1787/b25efab8-en

Özgüç, C. S., & Cavkaytar, A. (2015). Science Education for Students With Intellectual Disability: a Case Study. https://hdl.handle.net/11421/15047

Safrizal, S. (2021). Gambaran Kemampuan Literasi Sains Siswa Sekolah Dasar di Kota Padang (Studi Kasus Siswa di Sekolah Akreditasi A). El-Ibtidaiy:Journal of Primary Education; Vol 4, No 1 (2021): El-Ibtidaiy; 55-64 ; 2615-6121 ; 2620-3251. https://ejournal.uin-suska.ac.id/index.php/elibtidaiy/article/view/12362

Sari, P. M., & Yarza, H. N. (2022). Pelatihan penguatan literasi sains, keterampilan proses sains dan teknologi bagi guru-guru sekolah dasar. SELAPARANG: Jurnal Pengabdian Masyarakat Berkemajuan, 6(1), 87. https://doi.org/10.31764/jpmb.v6i1.7175

Situmorang, R. P. (2016). Integrasi literasi sains peserta didik dalam pembelajaran sains. Satya Widya, 32(1), 49. https://doi.org/10.24246/j.sw.2016.v32.i1.p49-56

Solihin, A., Iswanto, B. H., & Wibowo, F. C. (2022). Development of Mobile Learning Applications (MLA) Electromagnetic Induction Based on PjBL to Improve Students' Critical Thinking Skills. Journal of Physics: Conference Series, 2392(1), 012014. https://doi.org/10.1088/1742-6596/2392/1/012014

Sugiyono. (2015). Metode Penelitian Kuantitatif, Kualitatif dan R&D. Bandung: Alfabeta

Syaodih, E., Kurniawati, L., Handayani, H., & Setiawan, D. (2021). Pelatihan Sains Kreatif pada Guru Pendidikan Anak Usia Dini. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 5(2), 1854-1859. https://doi.org/10.31004/obsesi.v5i2.771

Trisiana, A., & Wartoyo. (2016). Desain Pengembangan Model Pembelajaran Pendidikan Kewarganegaraan Melalui ADDIE Model Untuk Meningkatkan Karakter Mahasiswa Di Universitas Slamet Riyadi Surakarta. PKn Progresif, 11(1), 313–330.

Widiyanti, I. S. R., & Mizan, S. (2021). VALIDASI BUKU PENILAIAN BERBASIS LITERASI SAINS (BuPeNa BeRiSi) UNTUK CALON GURU SEKOLAH DASAR. Autentik : Jurnal Pengembangan Pendidikan Dasar, 5(1), 21-32. https://doi.org/10.36379/autentik.v5i1.100

Winata, A., Cacik, S., & R. W., I. S. (2017). Analisis kemampuan awal literasi sains mahasiswa pada konsep ipa. Education and Human Development Journal, 1(1). https://doi.org/10.33086/ehdj.v1i1.291

