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Designing Scientific Learning for Ecosystem Thematic Learning in Fifth Grade Primary School

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Abstract: This research aims to design instruction for ecosystem thematic learning with a scientific approach in fifth-grade primary school. This research used the development model of Lee and Owen (2004), consisting of the assessment, analysis, and design stages. Subjects in this research were fifth-grade primary school at SDN Pisangan Timur 11. The data was collected using observations and interviews, which showed that the learning outcomes of some students still had scores below the passing grade. In addition, the thematic ecosystem learning was not optimal; the learning media used had not helped students to understand ecosystem knowledge more deeply because it only used video support and PowerPoint from the teacher, and the learning strategies or methods used are boring too. This research concludes that learning design is possible to increase the grade of student learning outcomes. Second, the scientific approach model has the characteristics of "doing science". This approach can make it easier to improve the learning process.

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Introduction

Curriculum 2013 in primary schools was implemented with the main characteristics of thematic Learning. Thematic Learning aims to improve the quality of education from the process and results. Thematic Learning is for students with a scientific mindset or who want to know, analyze, and present. *Thematic Learning* is a learning strategy put forward by many researchers and psychologists (Mirjalili, Jabbari, & Rezai, 2012). Thematic Learning at the primary school level is integrated Learning that uses themes to combine several subjects to produce a more meaningful experience for students. (Davies & Shankar Brown, 2011) claims that thematic Learning is a process suitable for 21st-century learners. The reason for the stages in thematic Learning is that it allows teachers to challenge students to reflect on their lessons. They must learn to relate it to the knowledge that interests them. In other words, Thematic Learning there is an association process (Mirjalili, et al., 2012).

Thematic Learning has been applied at the primary school level in every aspect for several years. Thematic Learning brings together various skills and various subjects into various themes. Unification is carried out in two ways: unfication attitudes, skills, and knowledge in the learning process and unfication of related basic concepts. Thematic means basic concepts so that students learn are not only partial. One of the integrated in thematic Learning is the ecosystem theme in fifth-grade primary school. Implementation of thematic Learning in primary schools is an urgent thing to research, considering the advantages of learning with a scientific approach. However, many teachers have difficulties implementing thematic Learning, starting from the classroom's planning, implementation, and assessment stages. Implementing thematic Learning in primary schools has not been optimal because

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teachers have difficulty managing large classes and students (Park, 2008). Most teachers still need training and assistance to apply thematic Learning (Wangid, Mustadi, Erviana, Arifin, 2016).

Curriculum 2013 adopts three competency domains and several innovations in each domain with a developed activity hierarchy. It can be seen in the Attitude domain through "accepting, implementing, appreciating, living, and practicing." Domain knowledge is obtained through "remembering, understanding, applying, analyzing, evaluating, creating." Domain skills are obtained through "observing, asking, trying, reasoning, presenting, and creating" (Shafa, 2014). Curriculum 2013 also uses a scientific learning approach. As intended, the scientific approach in learning includes observing, questioning, associating, experimenting, and networking for all subjects (Shafa, 2014). The Scientific approach is used in learning that is carried out through a scientific process. In that way, what students learn and acquire is done with their senses and minds, so they are directly in the process of gaining knowledge. With this approach, students can face and solve problems as well (Fadlillah, 2014).

The scientific approach makes learning more active and not boring. Students can construct their knowledge and skills through facts found in field investigations. In addition, with a scientific approach, students are encouraged to be more capable of observing, asking questions, reasoning, and communicating or presenting from natural phenomena or direct experience (Ine, 2015). The scientific criteria referred to in the scientific learning process are: (1) learning materials based on facts or phenomena that can be explained by logic or reasoning are not imaginary. (2) explanations from the teacher, student responses, and teacher-student educative interaction limited from assumption, subjective thinking, or some reasoning that is out of context of logical thinking. (3) encourage and inspire students to think critically, analytically, and appropriately in identifying, understanding, solving problems, and applying subject matter. (4) encouraging and inspiring so that students can think hypothetically about differences, similarities, and links to one another from learning materials. (5) Being able to encourage and inspire students to be able to understand, apply, and develop rational and objective mindsets. (6) concepts, theories, and empirical facts that can be accounted for. (7) Formulate learning objectives through simple, more interesting systems (Lusiana, 2014). A scientific approach is based on facts or phenomena that can be explained with logic or certain reasoning, not based on guesswork, fantasy, or fairy tales (Akhyar H. M. Tawil, 2014). Like with ecosystem material, the ecosystem as unity is a complete and comprehensive way between elements of the environment to influence each other. These environmental elements can also be called biotic and abiotic elements, both in living and inanimate things. Ecosystem materials are expected to inspire students to understand and protect ecosystems as their living environment. Ecosystem material can be introduced with direct objects or with ecosystem model theories.

In the explanation above, the researcher wants to examine further the implementation of thematic learning starting from the stages of learning, learning strategies, and learning outcomes in class fifth SDN 11 Pisangan Timur. In addition, researchers want to prove that learning design with a scientific approach will help the quality of learning for primary school students in implementing thematic learning.

Research Method

This research was research and development (RnD) but only implemented up to the design stage. The model used in this research was the Lee & Owen model. The Lee & Owens

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model (2004) was chosen in this research because it was a model specifically for developing multimedia. This research makes it possible to use multimedia in further research. The Lee & Owens model is the ADDIE development model developed according to Lee and Owens.

The Lee & Owens Development Model consists of five stages: (1) Assessment and Analysis in this stage there are two steps (a) Need Assessment and (b) Front-End Analysis; (2) Design; (3) Development; (4) Implementation and (5) Evaluation. Because this research only reached the design stage, the discussion of this research method is the needs assessment and analysis and then design stage.

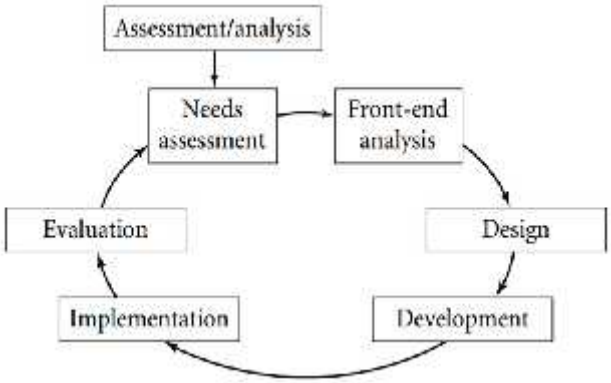

Figure 1. Lee and Owen's Development Model (2004)

The subjects of this research were fifth-grade students at SDN Pisangan Timur 11. The first stage of analysis was the Need Assessment. At this stage, the researchers conducted interviews and observations of teachers and students, which were conducted in March 2022. This analysis aims to find out the gap between actual and what should be.

The second analysis stage was Front-End Analysis, which conducted interviews with teachers to see the learning situation directly. This stage aims to obtain more complete information about what will be developed. In addition, this stage also looks at the learning outcomes of students who participate in ecosystem thematic learning in 2022/2023 academic year. At the design stage, the focus of development is to clarify the design of the learning program so that this learning program can achieve the learning objectives. At this stage, the information from the analysis stage is transferred into a document to explain the Core Competencies and Basic Competencies. Documents at this stage were redesigned as a lesson plan and learning frameworks as a basis for implementing learning and making decisions to determine the learning media to be used.

Results and Discussion

Needs Analysis

Based on the needs analysis from observations and interviews, it can be concluded that the needs analysis was carried out in two stages, namely, Need Assessment and Front-End Analysis, which showed that the learning scores of some students were still below the passing grades. At the Need Assessment stage, from the results of interviews and observations conducted in March 2022, fifth-grade students at SDN Pisangan Timur 11 in ecosystem thematic learning tend to be boring, fewer interactions between teachers and students, lack of time during face-to-face learning and online learning, Inadequate learning facilities and inappropriate methods, only applying one-way learning or paradigm "Teacher Centered". This fact was supported by teachers who only applied the expository learning

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method for face-to-face learning, which took 2 hours 30 minutes and 1 hour 30 minutes for online learning.

In the Front-End Analysis stage, this learning was not optimal because the media used has not helped students understand ecosystem material more deeply. In this lesson, the teacher only gives daily assignments through the WhatsApp Group. In addition, in this learning, the media used in class only used PowerPoint and supporting videos. The learning method used was quite boring because expository methods dominated it, making it less active. Based on data on this learning outcome, not all students can participate in this ecosystem thematic learning; some students still score below the passing grade in five ecosystem thematic subjects. The following are the learning outcomes of ecosystem thematic students at SDN Pisangan Timur 11 grade 5 in the 2022/2023 academic year:

Table 1. Ecosystem Thematic Learning Outcomes of Fifth Grade Students at SDN Pisangan Timur 11

Student	*Bahasa Indonesia*	*Civics Education*	*Natural Science*	*Social Science*	*Art and Culture*
	3.7	***3.4***	***3.5***	***3.1***	***3.3***
Student 1	100	100	92	83	75
Student 2	58	75	50	58	58
Student 3	50	75	75	67	92
Student 4	75	83	83	92	83
Student 5	75	58	75	67	83
Student 6	75	83	75	75	67
Student 7	67	75	92	83	67
Student 8	42	33	33	42	33
Student 9	50	92	75	75	83
Student 10	50	75	83	67	42
Student 11	83	75	75	50	58
Student 12	58	100	92	83	83
Student 13	75	83	75	100	75
Student 14	50	83	75	67	67
Student 15	50	83	75	58	42

Lesson Plan

At this design stage, the researcher redesigned the previous school's lesson plan. Lesson plans and learning frameworks were guidelines used by teachers to convey innovation and determine existing media to be used in ecosystem thematic learning. This design stage revised the existing lesson plan and rewrites the Core Competencies, which are equipped with the characteristics of the Basic Competencies and learning steps from a scientific approach to see the achievement of learning objectives.

Table 2. Revision of Lesson Plan

Lesson Plan
Name of Institution : SDN Pisangan Timur 11, East Jakarta
Class / Semester : Class V / Semester one
Theme : Theme (5) - Ecosystem Thematic
Sub-theme : Sub-theme (1) - Ecosystem Components
Subjects : Bahasa Indonesia and Natural Science
Lesson to- : 2
Time Allocation : 2 x 30 Minutes

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Short Description:

This ecosystem thematic learning discusses material applied in Natural Science subjects which contains ecosystems, ecosystem components, types of ecosystems, and Bahasa Indonesia subjects describing ecosystem concepts in non-fiction texts. Students are expected to be able to classify the meaning of ecosystems, components, types of ecosystems, and non-fiction readings about ecosystems.

Core Competency:

After participating in this ecosystem thematic learning, students are expected to be able to analyze the relationships between ecosystem components, how ecosystems are formed, types of ecosystems and main ideas or important information in readings about ecosystems.

Basic Competency	Indicator	Topics	Method	Cognitive Realm					
				C1	C2	C3	C4	C5	C6
Understanding the Definition of Ecosystems	Explain the definition of ecosystem	Definition of Ecosystem	Simulation		x				
	Outlining the Process of Ecological Succession in Ecosystems	Ecological Succession in Ecosystems	Question and answer		x				
Recognizing Relationships Between Ecosystem Components	Give Examples of Types of Ecosystems	Types of Ecosystems	Discussion		x				
	Identifying Ecosystems Based on Components in the Ecosystem	Ecosystem Components	Question and answer	x					
Explaining Interrelated Concepts in Non-Fiction Texts	Determining Main Ideas in Reading Non-fiction texts	Main Thoughts in Reading Ecosystem Non-fiction Texts	Discussion		x				

From the lesson plan that has been developed, it is hoped that it will be a guide by teachers to become a reference for carrying out ecosystem thematic learning that is conceptualized with a scientific approach. After revising this lesson plan can be more active and not boring, students can construct their knowledge and skills through the facts found.

Table 3. Learning Framework

Steps of Learning Scientific Approach				
Basic Competency	Indicator	Subject matter	Approach	Activity
Understanding the Definition of Ecosystems	Explain the definition of ecosystem	• What is an Ecosystem? • What are Biotic and Abiotic Components?	Scientific Approach (*Observing*)	In this activity the teacher opened the class by greeting, then the teacher gave an

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				apperception of the previous material, after which the students observed the material for the next phenomenon.
	Outlining the Process of Ecological Succession in Ecosystems	• Ecological Succession in Ecosystems	Scientific Approach (*Questioning*)	In this activity the teacher teaches succession material, after that the students form groups and discuss, then the students do questions and answers with the teacher.
Recognizing Relationships Between Ecosystem Components	Give Examples of Types of Ecosystems	• Types of Ecosystems • Classification of Animals Based on the Type of Food	Scientific Approach (*Experimenting*)	In this activity, students study material from several sources that have been provided, and groups discuss with each other.
	Identifying Ecosystems Based on Components in the Ecosystem	• Explanation of Ecosystem Types • Abiotic and Biotic Components • Interactions in Ecosystems • Food Webs in the Surrounding Environment	Scientific Approach (*Associating*)	In this activity, groups analyze information from the material they have studied and then write it on a group worksheet, after which each group presents the results.
Explaining Interrelated Concepts in Non-Fiction Texts	Determining Main Ideas in Reading Non-fiction texts	• Ecosystem concepts • Human efforts in maintaining ecosystems.	Scientific Approach (*Communicating*)	In this activity the teacher provides conclusions from the material that has been studied, then they create non-fiction concepts from the material, and finally do questions and answers.

After designing the lesson plan, it is hoped that the framework learning has implemented a scientific approach equipped with competency characteristics learning and learning steps. Scientific approach can implement thematic learning that is effective and easily understood by students.

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The scientific approach is learning to think creatively, and the scientific approach was introduced in the United States in the 19th century as a method used for scientific learning (V. Maria and F. Michael, 2018), which has the characteristics of "doing science". This method makes it easier for teachers to improve the learning process by sorting it into detailed steps or stages that contain instructions for students to carry out learning activities. The scientific approach to the curriculum 2013 follows graduate competency standards; learning objectives include developing attitudes, knowledge, and skills, which are elaborated for each educational unit. Attitude was obtained through accepting, implementing, appreciating, living, and practicing. At the same time, knowledge was obtained through remembering, understanding, applying, analyzing, evaluating, and creating. Then skills were acquired through observing, asking, trying, reasoning, presenting, and creating (Shafa, 2014).

By applying this approach, the learning process will be more memorable and meaningful for students because it teaches students to independently acquire new knowledge and information that can come from anywhere and anytime and not always depend on information from the teacher. Besides that, it can make students more active in constructing their knowledge and skills and can encourage students to carry out investigations to find facts about a phenomenon or event (Efriana, 2014). This research aims to improve student learning outcomes in ecosystem thematic material by redesigning learning designs so that learning becomes more active and less boring. Students can construct their knowledge and skills through the facts found.

Conclusion

The results of this study conclude that Ecosystem thematic learning can: first, the students' need for this learning design emphasizes student activity. By doing this research, it is possible to increase the value of student learning outcomes because many students still need to pass grades. Second, this scientific approach model is an approach that has the characteristics of "doing science." This approach makes it easier for teachers to improve the learning process because the scientific approach has to learn steps that enable students to study more actively and not make students bored, constructing their knowledge and skills through facts found in field investigations for learning. Third, the ecosystem thematic materials were selected based on needs analysis at the Need Assessment stage of this thematic learning, previously not optimal, and at the Front-End Analysis stage, also not utilizing proper supporting media.

Recommendation

Future researchers need to continue this development method up to the evaluation stage, not only at the design stage because the learning design only helps the learning process to be more memorable and meaningful for students, applying learning in the curriculum 2013 optimally and other efforts to help teachers more easily determine media.

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