The development of integrated textbook cooperative learning model to improve learning outcomes and practice literacy skills

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Abstract. In facing the challenges of education in the 21st century, education is expected to lead students to learn cooperatively (learning to live together) by using literacy skills in order to solve problems. The purpose of this study is to produce an integrated textbook of cooperative learning models to practice literacy skills. The biology material used in this textbook is virus material in X grade. The development of this textbook implements the 4-D model development steps. Textbook implementation in class using the Posttest-Only Control Increased student learning outcomes data were obtained through daily test score, while the literacy skills data were obtained through the assignments score that practiced literacy skills. The results of implementation on classes that use integrated textbooks of cooperative learning models on virus topics show the Daily test score and assignments score are better when compared to the control class. The average value of student assignments in the class using teaching material is 76.88 while the value of students in the class without using teaching material integration of innovative learning models is 72.73. It can be concluded that the integrated textbook of cooperative learning models developed can improve student learning outcomes and literacy skills.

Keywords: cooperative models, integrated textbooks, learning outcomes, literacy skills

1. Introduction
Recognizing the complexity of the challenges in the future, the UNESCO Education Commission (Commission Education for The "21" Century) recommends 4 pillars of education that can be used as a foundation for education include: 1) learning to know, which is learning to know by digging knowledge from various information; 2) learning to do, i.e. learning to do an action or expressing ideas; 3) learning to be, which is learning to recognize oneself and adapt to the environment; and 4) learning to live together, which is learning to live a life together and a community that is interdependent, so that they are able to compete in a healthy and cooperative manner and are able to respect others. Suto [1] states that 21st century science learning trends should ideally be directed at 4 components namely: communication, collaboration, critical thinking & problem solving, creativity & innovation.

To face the challenges of education in the 21st century, it is necessary to practice the scientific literacy and cooperative learning skills of students. The ability of scientific literacy can be defined as the ability of individuals to be able to identify those including scientific facts, use appropriate investigative methods to obtain the scientific evidence needed and the ability to analyze and interpret
the evidence so that meaningful conclusions can be obtained[2,3]. According to Rusilowati [4], several countries have set scientific literacy as the goal of science education groups helping one another learn from one another[5]. Thus, cooperative learning and literacy skills have the same focus of training students to be able to solve problems with scientific evidence collaboratively.

Textbooks are books used to assist teachers in carrying out teaching and learning activities. Textbooks are information, tools and texts needed for planning and studying learning. Cooperative learning models are practical ways that are used by teachers to help students learn, ranging from basic skills to complex problem solving. In cooperative learning, students work in small implementation[6]. Textbooks that are well designed and developed will be able to help students in the learning process, so students are not too dependent on the teacher as the only source of information. For teachers teaching materials can help teachers to reduce the time of presentation of material and increase the amount of guidance for students.

To achieve effective learning for students, textbooks are designed by integrating innovative learning models, especially on constructive tasks. This integrated cooperative learning textbook serves to link biological concepts with life contexts, conduct analyzes, observations, and experiments. This textbook helps students to construct knowledge, skills, and attitudes in which the collaboration of the three things is a reference to practice scientific literacy.

Based on this background, the purpose of this study is to produce integrated teaching books on cooperative learning models to improve learning outcomes and practicing literacy skills in students.

2. Methods

2.1. Development Stage

The development of this textbook follows the stages of Four D Models consisting of Define, Design, Develop, and Disseminate[7]. The define phase consists of the stages of curriculum analysis, student analysis, task analysis, concept analysis, and goal formulation. The design phase consists of the stages of preparing benchmark reference tests, media selection, format selection, and initial design of teaching materials. The develop phase consists of validation by experts and testing of teaching materials. Disseminate stage is the stage of using teaching materials that have been developed on a broader scale, but in this study the disseminate stage was not carried out.

2.2. Implementation Stage

In this product implementation, a Posttest-Only Control Design research design was applied[8]. This design technique, which is a group of study groups (classes) in SMAN 1 Kebomas Gresik, was randomly selected to be two groups, one experimental group and one control group. In the experimental group learning is done by using teaching material integration of learning models, while in the control group is given regular learning using teaching materials set by the school. The sample is randomly assigned to two classes as a sample. The sample for the implementation class was selected by the number of students 32 and the control class by 33 students.

At the end of the learning program students will take the test. The test developed is a teacher-made test and applies equally to the implementation class and the control class.

2.3. Data analysis

Analysis of completeness or student learning achievement is obtained from the following formula[9]:

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\text{Completeness} = \frac{\text{obtained score}}{\text{maximal score}} \times 100
\]

3. Result and Discussion

3.1. Integrated textbook cooperative learning model

In the preparation of integrated cooperative learning textbooks, there are four assignments on the virus topic that must be completed collaboratively by students. These assignments are described in table 3.1.
Table 3.1. Assignments are undertaken by students with a cooperative learning model on the topic of viruses

| Topics | Cooperative learning type | Task Descriptions |
|--------|--------------------------|-------------------|
| Virus structure observation | Think-Pair-Share | Students are asked to measure the structure of the virus using a light microscope, then discuss the observation results in pairs, match each other's opinions and then make conclusion based on pair discussion. |
| Make a virus replica | STAD (Student Team Achievement Division) | Students are asked to groups, each group consisting of 4 students. The group of students was asked to make a bacteriophage structure in 3D, then discuss together one by one the structure of the bacteriophage made and their description. After discussion, each group presents the results of the discussion in front of the class. |
| The incubation period of the virus that causes the disease | Think-Pair-Share | Students pair up to discuss about the various viruses that cause human diseases, the replication cycle experienced by viruses, the length of time the virus is incubated, and the symptoms of the disease caused by the virus. After discussion, each group was asked to present the results of the discussion in front of the class. |
| Solving the problem of soybean farming infected by viruses | Group Investigation | Students are asked to form groups of 5 students. Student groups were asked to investigate armyworms that infect soybean plants. The group of students was asked to find a solution to control the armyworm using a virus that could infect and kill the armyworm. The virus could be an agent controlling the population of the armyworm. After investigation and discussion, each group was asked to present the results of the discussion in front of the class. |

There are several types of cooperative learning that are distinguished based on group structure, type of material, and management. The type of STAD material chosen to be taught is to teach clearly defined fields of study that are applied studies and scientific scientific concepts. This type of group investigation is used for study projects by emphasizing mastery, analysis, and synthesizing information in connection with efforts to solve multi-aspect problems[10]. Think-Pair-Share type is used for material that has a typical formulation of ideas or material that has been clearly defined[5].

3.2. Learning outcomes

There are two scores from student learning outcomes, daily tests score in Table 3.2 and the score of assignments that practice science skills in Table 3.3.

Table 3.2. Daily test score in the topic of virus

| Control class | n students | Percentage | Implementation class | n students | Percentage |
|---------------|------------|------------|---------------------|------------|------------|
| >completeness | 3          | 9,09       | >completeness       | 2          | 6,25       |
| ≥completeness| 30         | 90,91      | ≥completeness       | 30         | 93,75      |
| Total         | 33         | 100        | Total               | 32         | 100        |
Table 3.3. Assignments score in the topic of virus

| Participants       | n students | Average score | Std. Deviation | Std. Error Mean |
|--------------------|------------|---------------|----------------|-----------------|
| Virus tasks        |            |               |                |                 |
| Control class      | 33         | 72.73         | 23.355         | 4.066           |
| Implementation class | 32     | 76.88         | 14.185         | 2.508           |

The percentage of students who can complete the results of daily tests on the virus topic in the implementation class is 93.75% and those using school textbooks are 90.91%. The analysis of this data also states that the daily scores of students on Virus topics using textbooks on cooperative learning model integration are better when compared to the control class. The average score of students in the integrated textbook implementation class is 76.88 while the value of students in the control class is 72.73. Thus, both the data from the results of daily test scores and assignment scores indicate that the integrated textbook cooperative learning model gives better results than the regular textbooks used in schools.

This result is reinforced by the findings of Puspani[11] which states that the use of STAD learning strategies has the potential to increase students' understanding of concepts and critical thinking skills. The results of data analysis are consistent with relevant learning theories. According to collaborative learning theory (cooperative and inquiry), students will find it easier to find and understand difficult concepts if they discuss each other's problems with their peers. Through discussions between friends in the group during the activity there will be an exchange of ideas between students and cognitive elaboration. Learning activities are centered on students in the form of discussions, working together, helping each other and supporting problem solving. Through effective learning interactions students are more motivated, confident, able to use higher-order thinking strategies, and able to build interpersonal relationships. The collaborative learning model allows all students to master the material at a relatively equal level of mastery of the material. This is in accordance with the opinion of Vygotsky [10], namely higher mental functions generally appear in conversations or cooperation between individuals before higher mental functions are absorbed into the individual.

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