Problem solving learning model using video application

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Abstract. Lecturer play an important role in the process of planning the learning activities, one of them is in the selection of learning model. This research aims to improve the student activities and learning outcomes in the course of chemistry food materials using problem solving learning models integrated with video media. This research was a classroom action research, which consists of 3 cycles. The participants were students of the chemistry education study program who enrol chemistry food materials courses in the odd semester of academic year 2017/2018, totally 35 people. The data analysis technique is by calculating the average value and classical learning completeness. The data were gathered from test in the end of every cycle. It was found that the student’s ability in learning process improved after the implementation of Problem Solving model. It could be seen in the improvement of average score for each test, from 78,81 in cycle I, 80,18 in cycle II to 85,69 in cycle III. In addition, classically learning completeness of students also improved, from 82,86 % in cycle I, 88,57 in cycle II to 100 % in cycle III.

1. Introduction
The chemistry food materials course is a compulsory course that must be taken by students in 5th semester. Based on observations / experiences in the field, the learning method for the Chemistry food materials courses uses lecture and question answer methods with LCD and whiteboard media. The lecture method has a weakness only centered on lecturer, passive students, not much giving students the opportunity to solve problems and thinking, giving students less opportunities to express their own opinions, and voluntarily arrested, and directed at targeted targets for teaching materials. Question and answer method is a method that can encourage and direct learning activities. Some of the questions raised include: questions raised by students, questions raised by students, can focus students' attention on certain parts which indeed must be discussed in other parts. However, this method cannot help in increasing and increasing students' understanding of subjects that have specific and abstract characteristics that require high imagination ability. This second method has been used in testing Food Material Chemistry so far. This second method only addresses the cognitive domain, but not for other domains such as the affective domain (attitude/values) and the psychomotor domain (skills). Learning about a subject must be done by using a combination of several appropriate methods.

The problems of weak collaborative problem solving skills and science process skills can be solved by using Problem Based Learning (PBL) model and Collaborative Problem-Solving (CPS) model, science process skills and self-confidence are essential components of the collaborative problem-solving process [1]. The choice of models and methods in learning certain subjects greatly influences the success
of the learning process. The learning model is a plan or pattern that can be used to approach learning, form a curriculum, design learning materials, guide lessons in class or others. To achieve certain learning goals and serve as a guide for learning designers and instructors in planning teaching and learning activities [2,3].

Chemistry Food materials is an applicative course group. Teaching material from the real world must be presented in the classroom, so teaching material can also be packaged using Video Media in the form of a Handycam, to combine sound, images, writing, and animation. With this media, students will be interested and quickly in understanding the course material. In order to achieve the three domains of learning, namely the cognitive domain (knowledge), the affective domain (attitude / value) and the psychomotor domain (skills) and the achievement of the expected competencies of the Chemistry Food Materials course, so a competency-based Problem Solving learning model is proposed with the packaging of teaching materials using Video Media.

Problem solving is defined as the ability of the individual to employ the information and skills he has acquired in encountering ambiguous situations as the range of processes, skills, ideas, measures, methods and strategies used by the learner to reach a complex or unusual solution [4,5]. Problem Solving learning model aims to bridge between the theoretical / abstract concept world and the real world, so students have empirical experience. The Problem Solving and Media Video learning model is oriented towards cognitive abilities (knowledge), affective (attitudes / values), and psychomotor (skills). Problem Solving Learning Model is learning that uses problems as a basis for learning material for students so students can learn to think critically and skilfully solve various problems to obtain essential concepts / knowledge [6]. Collaborative problem solving has been identified as a particularly promising task that draws upon various social and cognitive skills, and that can be analysed in classroom environments where skills are both measurable and teachable [7].

Problems can be raised or given by the teacher to students, from students with the teacher, or from students themselves which are then used as discussions and solutions are sought as student learning activities. Of course the problem is in accordance with the topic or topic that should be studied. If students are often given the opportunity to participate in school and community life, then there is a good opportunity for them to practice problem solving skills [8,9].

The development of competency-based problem solving learning models using video media is intended for students of the Chemical Education Study Program FKIP UNIB academic year 2017/2018 who take chemistry food materials courses as a target of development. The developed media is used in the form of learning videos with the application of problem solving learning models in class. With the learning video, students not only think abstractly / imagine only about additives, dyes and harmful substances in food and their effects but can see directly from the video. The teaching methods used are lectures, questions and answers, discussions, demonstrations, assignments and so on through the application of problem solving learning models. The quality of learning can be seen from the results of learning and student activities illustrated in learning that takes place in two directions.

The role of the media as a communication tool in the learning is as a source of learning and aids, both auditive, visual and audiovisual media can help lecturers and students in enriching insights because in addition to being able to contribute to students’ knowledge and skills as well can help teaching staff in universities to facilitate the learning process, clarify learning materials with a variety of concrete examples, facilitate interaction with students, provide opportunities for practice for students, and provide opportunities for evaluation of various forms of learning media and technology.

In general, the benefits of audiovisual media technologies in the learning process are to facilitate the interaction of lecturers and students with the intention of helping students learn optimally and an important factor in achieving enhanced learning and can improve the student’s learning outcomes [10-18].

2. Methods
The research applied was Classroom Action Research (CAR) since it was intended. It consisted of three cycles, and each cycle was divided into four steps; they are: planning, action, observation, and reflection.
The subjects of this study were all students of the Chemistry Education Study Program FKIP Bengkulu University who enroll Chemistry Food Materials course of the academic year 2017/2018 totally 35 people. This research was conducted at one of the State Universities in Sumatra, Indonesia, with the time of the study starting from May to November 2017.

The instrument used in this research is a test. Test results were analyzed by calculating the average grade and student’s classical absorption. Observation data is used to reflect lecturer actions and student activities that have been carried out in each cycle and are processed descriptively quantitatively using a rating scale. Result of the test is analyzed by using analysis-evaluation technique. To know the student’s score, the students answer is measured by the formula as follows:

\[ \text{Score} = \frac{\text{Correct answer}}{\text{Total answer}} \times 100 \]  

The minimum mastery criteria (KKM) is 70, so that the students can be declared that they are successful when they get the score of 70 or more.

3. Results and discussion

After analyzing the data, the results were as follows:

Pre-Cycle:
- Learning in chemical education study programs that take place so far is usually students learn individually.
- The students still did not know about any kind of teaching model, mainly in cooperative learning.
- The students’ average score was not quite satisfactory.

Cycle I:
- The students were not familiar with the implementation problem solving model integrated with video and power point.
- The number of students who passed the KKM had improved than in the pre-cycle. The percentage was 82.86% of the total number of students.

Cycle II:
- The students were familiar with the problem solving model, and students can working as a team.
- The number of students who passed the KKM had improved than in the cycle I. The percentage was 88.57% of the total number of students.

Cycle III:
- In cycle III, the total number of students completed (Students who pass the minimum mastery criteria (KKM ≥ 70)) 35 people. The percentage was 100% of the total number of students.

3.1. Learning outcomes

The implementation of learning in cycles 1 to 3 is carried out by applying the problem solving learning model using PowerPoint and video as an effort to improve the quality of learning in Food Chemistry courses. In teaching and learning activities also carried out group discussions that enable students to be actively involved. In group learning gives students the opportunity to express ideas, listen to the opinions of others, and jointly construct knowledge by individual students. Learning in cycles 1 to 3 is carried out in groups, learning groups are formed heterogeneously, striving to occur heterogeneous learning groups in terms of academic ability or gender. Each study group consists of 5-6 students. The use of instructional media as a source of messages can provide encouragement to students to learn more
actively because in addition to being easily understood in the context of learning directly to students, it is also an effective means for capable lecturers to convey information relevant to the competency target of the course. The use of instructional media in the Food Chemistry course can also make the teaching and learning process in the classroom more attractive so that students will be more motivated in learning and ultimately the competencies that are expected to be achieved optimally. Traditional methods (lectures and discussions) in learning are still used, but varied with problem solving models that use problems as a basis for learning material for students so that students can learn to think critically and skilfully solve problems to obtain essential concepts or knowledge. One of the important considerations in the use of instructional media is that the topics in the Food Chemistry course are applicable, so the use of interesting programs from PowerPoint and video media can provide solutions to learning problems.

Learning outcomes obtained by students from the application of problem solving models and the use of power point and video learning media in cycles 1, 2 and 3 are presented in Table 1.

| No | Description | Post-test Cycle I | Post-test Cycle II | Post-test Cycle III |
|----|-------------|------------------|-------------------|--------------------|
| 1. | Number of students | 35 People | 35 People | 35 People |
| 2. | The total number of students completed (Students who pass the minimum mastery criteria (KKM ≥ 70)) | 29 People | 31 People | 35 People |
| 3. | Unfinished number of students | 6 People | 4 People | 0 People |
| 4. | Average of value | 78,81 | 80,18 | 85,69 |
| 5. | Classically Learning completeness (%) | 82,86% (Not Completed) | 88,57% (Completed) | 100% (Completed) |

Student learning motivation can be improved by applying problem solving models and using video media. Students are required to think critically and creatively. Develop the concept of knowledge possessed and able to solve problems related to learning material. The media used is PowerPoint which contains material / basic concepts about Food Chemistry along with learning videos related to learning material. Videos are presented in the form of hyperlinks in PowerPoint. This video can be made by yourself, can also be downloaded from YouTube / internet. The aim is to enrich lecture material so students are more interested and see the video presentation. For example about the use of additives in food, the impact of the use of harmful compounds in food, videos about preservatives such as formaldehyde and borax and videos related to learning material. At the end of the lecture before the exam students are also given the assignment to make videos. This video was made by students in their groups. With this assignment, besides being able to apply / practice the theory obtained in the field, students also have the ability to make videos with the lead / movie marker program.

The process and student learning outcomes (student learning achievements) obtained fall into the category of both absorption and mastery learning well. From these results it can be concluded that it turns out that the use of problem solving learning models with video media provides high learning motivation from students. Students are more enthusiastic, not bored and learning materials can be resolved properly. This of course will also affect the activeness and creativity of lecturers in teaching and learning activities.
3.2. Student and lecturer activities

Comparison of lecturer activities from the use of problem solving learning models with video media is presented in table 2.

Table 2. The comparison of lecturer activities in cycles I, II and III.

| Cycles | Score average | Total of Category |
|--------|---------------|-------------------|
| I      | 27            | Good              |
| II     | 28            | Good              |
| III    | 29            | Good              |

Comparison of student activities from the use of problem solving learning models with video media is presented in table 3.

Table 3. Comparison of student activities in cycles I, II and III.

| Cycles | The Average Score | Total of Category |
|--------|-------------------|-------------------|
| I      | 18                | Enough            |
| II     | 20                | Good              |
| III    | 22                | Good              |

Student learning achievement obtained through learning by applying problem solving learning models with video media is included in the category of good absorption and classical learning completeness is also good this is influenced by interesting subject matter because it deals directly with students, laboratory work that provides more understanding both towards students about the material being discussed and the great motivation of students to understand the material. This can be seen in the activeness of students who fall into either category. Besides that, it is imperative for students to present the results of problem solving obtained by encouraging students to understand the material better.

Seeing the observations in the first cycle, student activities in applying the problem solving learning model were still considered sufficient. Shows that students are still facing difficulties and are not ready because they are new to this learning model, even though this model is actually similar to group discussions that are usually done. On the other hand there are also students who feel happy and are encouraged to be more active and creative in expressing their opinions. In cycle II and III the students' activities become good, many students have been active and involved in discussions, able to solve problems related to learning material, dare to express their opinions and be able to present and conclude the results of the discussion well.

The use of problem solving learning models with video media as a source of independent learning turns out to be able to improve learning outcomes, student activities in the Food Chemistry course when compared to the initial knowledge of previous students. This is because students can be involved in the learning process by listening and seeing, so they have a high absorption ability to remember information, objects and events. Audio visual media products that have been made can function as a teaching aid in learning so that lecture material can be presented more systematically, structured and more attractive to students, while it can also be used as a source of independent learning for students.

This corresponds with the results of the study done by some researchers, is the application of the learning model assisted by audio-visual media can improve the positive character and students' learning outcomes [19]. Audiovisual based media is more interesting and provides motivation to students to learn more material, audio-visual material can prepare interesting variations for changes in the level of learning speed on a subject or a problem. There are numerous benefits that students derive from the use of audio-visual aids, but quick understanding weighed more [20]. Using audio/visual aids in teaching is one way to enhance lesson plans and give students additional ways to process subject information [21]. There is a relationship between the variation of learning methods, learning media, and learning resources
simultaneously to the achievement of the competency standards of junior high school graduates in the City of Bengkulu [22].

The questionnaire was used to determine the responses and attitudes of students towards problem solving models by using PowerPoint media and video as teaching aids and to find out the appropriateness and appearance of multimedia presentations made as chemical learning aids. From the questionnaire that has been filled out by students, the average response given by students to the Food Chemistry course is Good. From the questionnaire, it is also known that the main reason students take the Food Chemistry course is in addition to this course. Must be taken, some students also feel that they can gain knowledge that can be utilized after graduation. In addition, the average student gave a statement that after participating in the study of Food Chemistry courses, they felt the benefits in the form of knowledge that was needed as a provision for teaching in high school and the knowledge gained could be used as capital for life skills.

4. Conclusion
Based on research that has been done, it can be concluded that the application of Food Chemistry learning using problem solving learning models with video media as a source of independent learning can improve learning outcomes, can improve mastery and understanding of material by students. This is indicated by being able to increase the average value of students in each cycle. With absorption and mastery learning classically included in the Good category. Student learning activities also increase each cycle, this is because students are able to express concepts / problems that they do not understand, define and organize learning tasks and find various solutions to solving problems. Audio visual media products that have been made can function as a teaching aid in learning so that lecture material can be presented more systematically, structured and more attractive to students, while it can also be used as a source of independent learning for students.

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