Student conception about the quality of packaged water

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Abstract. Instead of a pure state, water on earth contains a variety of material, either dissolved or suspended, including microbes. Therefore, before being consumed, water should be processed first to reduce levels of contaminants to a safe level. Standard of water quality for household need (Permen No.492/MENKES/PER/IV/2010) is usually used as a reference for drinking water requirement. This preliminary study was carried out to investigate students' conception of packaged/bottled water quality assurance produced by certain vocational schools as products of their students. The explanatory survey method was used in this study to detect their conception deeply. The respondents or participants of this study was ten graders from a public vocational school in Subang and their teachers in Agribusiness course. Data were collected through observation, interview, and test for their preconception. Research results show that students' knowledge about mineral water is not in line with their understanding of the water quality, and their teacher's as well.

1. Introduction

Biology is one part of Natural Sciences whose material has been studied from junior high school level in hopes of being able to train students to learn to think realistically, creatively and systematically. Microbiology is a branch of biology that studies microbes. Microbes or microorganisms are formed from one cell or several cells that can only be seen with the help of a special microscope. Classically microbes are classified into two, namely plants (Plantae) and animals (Animalia). Microbes play a role in the process of overhauling and the preparation of organic compounds to produce products that are beneficial to humans, one of which is in food. But microbes can also cause harm because they are contaminating agents and decay in food, and cause interference with human health. The existence of microbes can determine the quality and level of safety of food and drink [1].

One food product that is susceptible to contamination by microbes is bottled water. Water is a growth medium that is good for bacteria because it contains several organic compounds that can be a source of food for microorganisms. Regulation of the Minister of Health of the Republic of Indonesia No.492 / MENKES / PER / IV / 2010 concerning the requirements of drinking water quality which states that water that goes through the treatment process or without processing process meets the health requirements in physics, chemistry, microbiology and radioactive. To maintain the quality of bottled drinking water consumed, the quality of drinking water is monitored internally and externally by the producers of bottled water [2]. The requirements for bacterial contamination in bottled drinking water at the Indonesian National Standard (SNI) 7388 in 2009 concerning maximum limits of microbial contamination in food only state that Salmonella, Pseudomonas aeruginosa, and Escherichia coli...
bacteria are not allowed in bottled water and are not required to identify the presence of Staphylococcus aureus bacteria. One of the diseases caused by contaminated beverages is diarrhea. Based on the report of the World Health Organization (WHO) in 2001, there were 200 million cases of diarrhea per year with 2.1 million died due to problems with drinking water hygiene. Until now diarrhea is the ten most diseases.

Vocational high school is one of the education units at the High School level of education that has a vision that is to prepare the results of qualified graduate students to meet the needs of the world of work and develop a professional attitude. To support the vision of the Vocational High School, there are vocational programs in vocational schools that are tailored to the needs of employment (Kemendikbud, 2013). Article 15 of Law No. 20 of 2003 concerning the National Education system that in Vocational Schools, students with talents and abilities in their chosen field will be prepared and fostered to become skilled and ready to train workers, adapt easily to the environment and change, and can develop themselves in order to meet the needs of the job market in various sectors that are always developing [3].

Vocational education as special education is planned to prepare students to enter the workforce and be able to develop professional attitudes in their vocational fields. Graduates of vocational education are expected to be productive workers who can create superior products that can compete in the free market. Preparing vocational graduates as middle-level workers who are expected to become productive workers, ready to enter the workforce and able to develop their expertise in the field of vocational. [4]

According to research by Lani Meita I F et all 2018 [5], the learning is done at PP Lembang Vocational School to reach the cognitive domain of students, should emphasize the Project Based Learning (PjBL) project-based learning model. The PjBL model is a learning model that uses projects (activities) as the core of learning. PjBL learning is proven to improve student creativity. PjBL learning is proven to improve student creativity. In PjBL learning students are required to make projects that focus on product development or performance, where students conduct studies or research, solve problems and synthesize information. The final results in learning are in the form of products that are the result of student group work and students understand what they have produced.

Subang State Vocational High School 2 in the field of Agricultural Product Processing Agribusiness (APHP) prepares students to process agricultural products or other materials that can be used as drinks and food that will be consumed by the wider community and produce economic value. The background of this research is to analyze students' knowledge and abilities towards quality assurance, as well as to measure students' ability in testing microbiological aspects of packaging beverage products produced so that they are safe and have good quality for public consumption.

From the explanation of several references related to this research, produce a problem formula: (a) how is the ability to analyze students on the quality assurance of water products that will be produced? (b) what is the knowledge of students about quality assurance of packaging water products produced by the school of SMKN 2 Subang.

2. Methods
This study uses a survey method with a quantitative approach. This study produced a goal: "To explore students' knowledge of quality assurance of bottled mineral water products," to see the extent of students' understanding in producing a product that is produced and distributed to the wider community.

The method of testing in this study is the observations made on respondents consisting of teachers and students of class X from the Agribusiness Department of Agricultural Product Processing (APHP) at SMK 2 Subang. Data collection was done by initial observation, then continued with interviews to determine the ability of the teacher in providing information about microbiology, especially on food, and students' insight into the safety of the packaging beverage products they produce.

2.1. Interview questions
The questions asked in the interview consisted of 12 questions. The questions raised try to uncover students' knowledge and understanding of the products (bottled mineral water) produced.
The following is a list of questions submitted to students during interviews: (1) Where do you sell the beverage products that you produce? (2) Do you know how to make a product base on good manufacturing practice? (3) Are you sure that the product you are selling is safe? (4) Do you know if microbes can be in the packaging you made? (5) Do you know about laboratory quality standards or (ISO 17025: 2005)? (6) Do you know there is a maximum limit of bacteria in bottled water? (7) Are teachers always involved in making bottled water? (8) In biology learning, do you learn about microbiology? (9) Do you think it is enough to study biology now for the future? (10) Are you interested in microbiology? (11) Do you think the laboratory used is sterile? (12) If microbiologists can see the level of bacteria in the products you produce, is it important that you study microbiology?

3. Result and Discussion

The results showed that students of SMK 2 Subang did not understand the danger of bacterial contamination in the packaging drinks they made. They are only provided with the ability to process several types of bottled water products such as mineral water, turmeric drinks, guava fruit juice drinks, and pineapple juice drinks. They stated that they were equipped with the skills to utilize agricultural produce which they could then sell. They did not know at all the dangers of bacteria from the products they produced. Respondents also said they did not know how to check and calculate the number of bacteria in bottled water. This is very dangerous for consumers who are accustomed to buying and consuming bottled water produced by students. It is inversely proportional to most of the teachers' statements that students know that excessive amounts of bacteria can be harmful to a packaged drink.

Biology or productive subjects are not taught at all about microbiology, because they think microbiology is only for chemistry or analysts, so they don't need to study, besides microbiology is difficult and not too relevant. Respondents revealed that they studied the biotechnology chapter but did not explain the initial treatment process, they only followed the guidebook that was provided. In the process of processing and production, subject teachers do not accompany, so respondents work to process their agricultural products and only refer to the books given. There are no complaints from consumers regarding the products they produce, so it is considered that packaged beverages are produced well and are safe for consumption. The products they produce are mainly mineral water, the water tastes guava, pineapple, and turmeric have reached sales out of the city such as Purwakarta, Cirebon, Indramayu, and Cikampek.

Respondents complained about laboratory hygiene factors when processing food or agricultural products so that it was feared to affect the quality of the products produced. Based on teacher interviews stated that students know how to process a product that is good and true according to the rules that apply, but students state the opposite.

Similar to respondents, the biology teacher said that there were obstacles to applying microbiology subjects because conducive biology subjects were only given in class X. All vocational schools are focused on productive subjects, while adaptive ones are only a requirement for respondents to take the National Exams required by the Government. Responding to the quality of the water produced, the teacher states that if students follow the prescribed method, the product produced is safe. The teacher explained that the school did not have an adequate laboratory for testing bacteria on the products produced by students. He thought that it was not important because the students were not trained by analysts or chemists, so for things like that they were not needed in the Food Product Processing Agribusiness Department (APHP). The teacher stated that so far there were no complaints from consumers who bought products made by SMK 2 Subang so that microbiological debriefing for students on the products to be produced was not so important as long as consumers were fine.

In the observations above, it is very clear that teachers and respondents do not pay attention to the quality of the products they produce microbiologically because there are no complaints made by consumers so far. They assume that the products they produce are safe and sterile because they follow the rules given by the school according to the standard of product manufacture. Students do not know how to determine safe levels of bacteria in a package of bottled water. Teacher's and respondents' knowledge about microbiology is lacking. This is because the curriculum for vocational schools is very
limited for adaptive learning, as well as a lack of understanding of educators about the quality of products that will be produced. From the results of observations on products practiced by students of Subang Vocational High School 2 (adaptive Class X), it shows the orientation of practical activities that do not involve students. In designing planning is still teacher-centered, to realize learning biology that is student-centered requires collaboration from various parties (principals, student affairs staff, curriculum vice-chancellor, teacher coaches, and students) that are by the nature of the goals.

After conducting many interviews with the respondents and teachers concerned, it is very important for them to learn about microbiology before they make the production process of a packaged beverage product. They began to think what if the bottled water they produced resulted in mass poisoning or diarrhea. Of course, that will result in the election of SMK 2 Subang and the department that produces the bottled water. It is better to prevent than not at all is an expression that is very suitable for learning adjustments that students must know. Researchers and teachers concerned will provide learning about microbiology so that students understand the quality of the products they produce for the wider community. With the development of theory coupled with products produced by students of SMK 2 Subang still need to be examined or microbiologically re-tested so that the product is safe for consumption in a long period.

4. Conclusion
The importance of an institution or school especially vocationally pays attention to the quality of the products they produce before being distributed to the public for consumption. Drinking water is water that goes through processing or without processing that meets health requirements and can be drunk directly. Referring to the Indonesian National Standard (SNI) 7388 in 2009 concerning the maximum limit of microbial contamination in food, it was determined that the quality requirements for bottled drinking water must meet the limits of microbial contamination which consists of determining the total plate number (TPN), the number of coliform bacteria with the MPN method, and identification of pathogenic bacteria. The requirements for bacterial contamination in bottled drinking water at the Indonesian National Standard (SNI) 7388 in 2009 concerning maximum limits of microbial contamination in food only state that Salmonella, Pseudomonas aeruginosa, and Escherichia coli bacteria are not allowed in bottled water and are not required to identify the presence of Staphylococcus aureus bacteria.

As a follow-up study, the researcher suggests that this research can be continued by learning in class using the STEM (Science, Technology, Engineering, and Mathematics) model. The students will do the practicum themselves to test the bacteria in the bottled water of their products, for the topic of microbiology still meet the demands of the surrounding KD (3.9 & 4.9) "3.9 Applying the concepts and principles of how to check Escherichia coli foodstuffs. 4.9 Examining Escherichia coli foodstuffs. "Learning experiences using STEM can be combined with PPA so as not to ignore the nature of the learning objectives and meaningful for life long based (long term). Tests that will be conducted by researchers are Qualitative and Quantitative Tests of Coliform Bacteria. The reason researchers took this test because of microbiological water testing. Very important and can be carried out on all types of water available, especially to determine water quality standards. Given that water is the main source of life for all living things. Microbiological examination of water both quantitative and qualitative can be used as a measure of the degree of pollution. In addition to the presence of microorganisms in water, also the presence of organic material needs to get attention because the amount of organic matter that pollutes the water greatly affects the fertility of the growth of microorganisms.

5. References
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