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Responses and Efforts to Incorporate Essential Concepts of Food Safety into the Curriculum of Senior High School in East Java Indonesia

Ainur Rofieq
University of Muhammadiyah Malang, Indonesia
email: ainurrofieq@yahoo.co.id

Abstract. Teachers in Senior High Schools (Public Senior High School/Public Islamic-based Senior High School) in East Java only comprehend 42.5% out of thorough concepts of national food safety pursuant to Government Decree No. 28 Year 2004. Out of seven aspects of food safety, five of which are hard to comprehend, namely: genetic engineering, food packaging, contaminated food, food irradiation, and food quality assurance as well as laboratory examination. The other two aspects (hygiene-sanitation and food additives) are fairly good comprehended by the teachers. To raise students' awareness, the teachers have agreed to incorporate food safety materials into 2013 Curriculum and School-based Curriculum (KTSP). However, it turns out that not all materials are suitable to teach in senior high school level. Based on the needs analysis, there have been found two aspects of food safety to develop into the essential concepts, namely hygiene-sanitation and food additives.

Key words: food safety; curriculum

INTRODUCTION

The National Agency of Drug and Food Control of Republic of Indonesia has reported that, out of the samples of foods and beverages in six provincial capitals (Jakarta, Serang, Bandung, Semarang, Yogyakarta, and Surabaya), 72.08% of which contained harmful substances [2]. Indonesian State Intelligence Agency has also reported that based on the samples taken by The National Agency of Drug and Food Control in 2011, there are four kinds of harmful food additives: *formalin*, *borax*, *rhodamin B*, and *metanil yellow* contained in foods marketed around residences and schools [2],[6].

Food safety is the needed condition and effort to avoid some possibilities of contaminated food either by biological, chemical, or other destructing materials which result in the disturbance, damage, and danger for human health [1]. Pursuant to the Government Decree No. 28 Year 2004, there are seven aspects of food safety, namely: (1) hygiene-sanitation; (2) food additives; (3) genetic engineering products; (4) food irradiation; (5) food packaging; (6) food quality assurance as well as laboratory examination; and (7) contaminated food.

Indonesian Government has conducted a number of disseminations regarding food safety through a number of programs and national promotions. One of the efforts to cope with this sort of concern is by conducting dissemination targeted to schools so as to insert food safety materials into the curriculum [2]. As the part of curriculum, food safety materials require particular instructional approach, and thus a scientific approach [3] [4].

The insertion of additional materials relies upon the competences and creativity of teachers [4]. The thing to consider is that food safety policies are not formerly designed for instructional materials; accordingly, it is critical to elaborate those policies so as to be well integrated into curriculum. Some of the efforts to undergo are setting competencies, essential concepts/indicators, instructional approach, and learning resources. Those efforts seek for further development through researches in order to determine learners' needs, basic competencies, and essential concepts.

The research problems are: (1) How is the level of comprehension among teachers in Senior High Schools (Public Senior High School/Public Islamic-based Senior High School) in East Java on the concepts of national food safety pursuant to Government Decree No. 28 Year 2004?; (2) What are the feedbacks from the teachers with regards to the insertion and development of food safety materials into the school curriculum?; and (3) What are the food safety materials that are to be developed into essential concepts for developing learning resources?

METHOD

The design of this research was descriptive, by means of describing food safety materials taught by Biology teachers in Public Senior High Schools (SMAN) and Public Islamic-based Senior High Schools (MAN) pursuant to the concepts stated in Government Decree No. 28 Year 2004. The further stage to conduct was Research and Development by means of needs assessment and explanation to determine the essential concepts as the indicators of food safety competencies.

This research was conducted in Public Senior High Schools and Public Islamic-based Senior High Schools across East Java, with Biology teachers as the subjects. East Java was represented by four regencies, namely: Malang, Blitar, Probolinggo, and Bangkalan. The data were taken by employing observation technique, scaling method, and Focused Group Discussion (FGD). Observation was conducted to tap the details about the implementation of classroom instructional activities.

Scaling method was employed to measure teachers' comprehension levels on food safety materials. FGD was conducted to implement the essential concepts relevant to basic competencies and indicators required by the curriculum.

RESULTS

Observations were conducted in Grade IX, X, and XII of Public Senior High Schools and Public Islamic-based Senior High Schools in four cities of East Java province. It has been revealed that instructional activities in all observed classes have not integrated food safety materials as learning competencies. The absence of food safety concepts in classroom instruction has been triggered by the unavailable basic competencies nor indicators, both theories and practices, within the curriculum. In fact, some essential indicators of food safety are existent in instructional activities; among others are: the concepts of hygiene-sanitation, food additives, and food irradiation [4], [5]. However, those three concepts have been offered in different learning competencies and grades.

The materials and competencies related to the concepts of hygiene-sanitation, food additives, and food irradiation have not been focused on the concepts of food safety. In 2013 Curriculum, the concepts of hygiene-sanitation are offered to Grade X, with the emphasis more on environmental damage and its contributing factors [5]. The required competency is analyzing the data on environmental changes and their impacts to life.

The concepts of food additives are offered to Grade XI, directed to the materials of cell structures and functions in digestive system. The required competency is analyzing the correlation among tissue structures of digestive organs and connecting to the concepts of nutrition and bio-processes. The students are required to be able to explain digestive processes as well as indigestion problems through a number of literature reviews, observations, experiments, and simulations.

Food irradiation is introduced to Grade XII and integrated into bio-technology materials. The basic competencies include: comprehending bio-technology principles that implement bio-processes in producing new products to uplift the quality and welfare of mankind from various aspects of life [4], [5]. The observations and FGD in some schools implementing School-based Curriculum (KTSP) resulted in similar findings as those in schools implementing 2013 Curriculum.

This current research resulted in the following details, as presented in Table 1. Table 1 displays the percentages of teachers' comprehension in Public Senior High Schools and Public Islamic-based Senior High Schools across East Java, especially on the thorough concepts of food safety pursuant to Government Decree No. 28 Year 2004. In addition, Table 1 displays the percentages of aspects proposed to be the essential concepts of food safety materials, that are relevant to learning competencies stipulated by the curriculum.

Referring to Table 1, the average of the teachers' comprehension level, particularly the teachers of senior high schools across East Java Province Indonesia, on the concepts of food safety pursuant to Government Decree No. 28 Year 2004 is 42.5%. It implies that most of food safety aspects are less comprehended by the teachers.

Table 1. Comprehension Level and Aspects of Food Safety Materials

Seven Aspects of Food Safety Pursuant to Government Decree No. 28, 2004	Comprehension Level on Food Safety (%)	Aspects Proposed as Leaning Materials (%)
Hygiene-sanitation	67.9	82.1
Food Additives	52.1	95.2
Genetic Engineering Products	38.9	20.8
Food Irradiation	46.4	34.5
Food Packaging	48.8	46.0
Contaminated Food	43.3	46.9

There are four food safety aspects that the teachers have found them hard to comprehend, namely: genetic engineering products, food irradiation, food packaging, and contaminated food. Two other materials are well-comprehended by the teachers; they are hygiene-sanitation and food additives.

Based on the needs assessment, the teachers have agreed to incorporate the aspects of hygiene-sanitation and food additives into instructional materials. It has been quantitatively proven by the data that more than 50% teachers and students propose the insertion of those two aspects (82.1% for hygiene-sanitation and 95% for food additives) than the other four food safety aspects.

Analyzing the curriculum, it has been found that: (1) two aspects of food safety (hygiene-sanitation and food additives) stipulated in Government Decree No. 28 Year 2004 are to be inserted and implemented in both 2013 Curriculum and School-based Curriculum (KTSP); and (2) the following materials are to be incorporated into the two curriculums. For 2013 Curriculum, the aspects of food safety are to be inserted into the materials of environmental damage and its contributing factors. As for School-based Curriculum (KTSP), the aspects of food safety are inserted into the materials of environmental damage and wastes [3, [5].

The needs assessment on the aspect of hygiene-sanitation has resulted in four essential concepts to cover, among others: (1) the definition of hygiene-sanitation; (2) the requirements of food selling locations; (3) the requirements of food sellers, and (4) prayer before meals.

As for food additive aspect, three essential concepts have been proposed. They include: (1) recognizing the characteristics of foods contaminated with hazardous substances such as: formalin, borax, industrial sweetener and coloring; (2) comprehending and aware of the danger of formalin, borax, and restricted sweetener and coloring; and (3) comprehending and aware of haram (forbidden) foods.

The ultimate goal of introducing the essential concepts of hygiene-sanitation is that students are equipped with four attitudes when buying foods. Those four attitudes are as follows: (1) awareness of buying foods from clean places, far from wastes, dustbins, farming fields or plantations, etc. so as to avoid foods contaminated by wastes, germs, and pesticides; (2) awareness of buying foods only from sellers with healthy condition and proper dressing so as to avoid contagious diseases; (3) buying foods that are served with covers, namely: displayed in étalage, properly packed, stored in clean room, etc. in order to prevent the intake of dust-and-germ contaminated foods; and (4) buying foods from the sellers who make use of clean food serving tools, considering the danger of exposure to chemical substances not applicable for foods.

The insertion of food additive concept aims at arousing the students' comprehension and knowledge on the four concepts of hazardous food additives. First, the students are to be aware of the characteristics of foods added by harmful substances, for instance: formalin, borax, and industrial coloring. Below are the characteristics of foods containing harmful substances: (1) formalin-tainted wet noodles: non-sticky, glistening look, strongly-scented formalin, and the durability time of noodles is more than 1 day in room temperature; (2) formalin-tainted tofu: strongly-scented formalin, tough, and the durability time of tofu is more than 1 day in room temperature; (3) wet noodles, rice cake, meatballs, and grilled fish cake containing borax: chewy texture, non-sticky, and not easily broken; (4) crackers containing borax: crispy texture, bitter/tart taste, and remaining crispy after being unsealed for one day; and (5) foods containing industrial coloring: striking red (rhodamin-B) or striking yellow (methanyl yellow) in color, fluorescent, and uneven dots of colors.

Second, there is an urgency of introducing the danger of formalin. The chemical formula of formalin is H_2CO, in the form of gas, liquid, and solid. Formalin is also known as paraformaldehyde or trioxane. In industrial fields, formalin is used in the production of polymer and various chemical substances [7], [8]. Excessive exposure to formalin causes death.

Third, the students are to be introduced to the danger of borax. Borax is also known as the following popular local terminologies: pijer, gendar, bleng, cetitet, puli, and obat lontong. The chemical formula of Borax is $Na_2[B_4O_5(OH)_4]8H_2O$ [7], [8]. Some other names of which are natrium biborat, natrium piroborat, and natrium tetraborat decahydrate. In industrial fields, borax is used for solder material, cleaning material, wood preservative, wood antiseptic, and cockroach repellent. Consuming foods containing borax will end up with brain, liver, and kidney damages. The maximum concentration of borax in food is 1 gram/1 kg food [8].

Fourth, it is necessary that the students be aware of the prohibited food coloring and sweetener. Food coloring, both natural and artificial, evokes appealing perception on foods. Natural coloring is highly recommended than that of artificial one. Natural coloring has no long-term adverse effect. Artificial coloring is less preferred due to its drawbacks, among others: unstable color and susceptible to changes due to particular acidity level [8]. There are two kinds of artificial coloring, food coloring and prohibited coloring for foods.

CONCLUSION

The average of the teachers' comprehension level, particularly the teachers of senior high schools across East Java Province Indonesia, on the concepts of food safety pursuant to Government Decree No. 28 Year 2004 was 42.5%. It has implied that most of food safety aspects are less comprehended by the teachers.

Two out of seven aspects of food safety are to be inserted and implemented in both 2013 Curriculum and School-based Curriculum (KTSP). Those two aspects are hygiene-sanitation and food additives. For 2013 Curriculum, the aspects of food safety are to be inserted into the materials of environmental damage and its contributing factors. As for School-based Curriculum (KTSP), the aspects of food safety are inserted into the materials of environmental damage and wastes.

The four essential concepts to cover regarding hygiene-sanitation are among others: (1) the definition of hygiene-sanitation, (2) the requirements of food selling locations, (3) the requirements of food sellers, and (4) prayer before meals. As for food additive aspect, three essential concepts have been proposed. They include: (1) recognizing the characteristics of foods contaminated with hazardous substances, such as: formalin, borax, industrial sweetener and coloring; (2) comprehending and aware of the danger of formalin, borax, and restricted sweetener and coloring; and (3) comprehending and aware of haram (forbidden) foods.

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