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Research Article

Knowledge, Attitudes, and Practices of Filipino BSIT in Food Technology Students toward Food Hygiene and Sanitation

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ABSTRACT

This study mainly aims to determine the knowledge, attitudes, and practices among Filipino college students on food hygiene and sanitation in the context of flexible blended learning during the time of the COVID-19 pandemic. Twenty college students major in Bachelor of Science in Industrial Technology (BSIT) in Food Technology are purposively selected as the main respondents of the study. This mixed-method study reveals that the students have excellent knowledge, attitudes, and practices towards cleaning and sanitization procedures, the use of appropriate clothing, and the proper storage of foods during their laboratory activities. The very positive findings of the study indicate that the students have a high level of knowledge, attitude, and practices regarding general sanitary measures.

Keywords: *Food Hygiene, Food Sanitation, Marinduque, Mixed Method, Philippines*

Introduction

Food hygiene and sanitation emphasize the many practices needed to safeguard the quality of food to prevent microbial contamination, from farm to table: production, packaging, delivery/transportation, storage, processing, preparation, selling, and serving of food. These are vital for creating and maintaining hygienic and healthy conditions for the production and consumption of the food that we eat.

Unsafe food is usually the result of contamination from the presence of harmful substances. Some food safety hazards are caused by humans or the environment. One study identified that food handlers are the main cause of food contamination (Campos et al., 2009, as cited by Abdul-Mutalib et al., 2012). Eating foods that contain infectious or toxic substances may cause foodborne diseases. Thus, food handlers must observe proper food hygiene and sanitation to ensure that the foods being served to the public are free from contaminants. Keeping in mind the alarming result if proper handling of food is disregarded, it is

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imperative that all food handlers must not only have knowledge but also be able to understand and implement the basic principles of food hygiene and sanitation to protect consumers from foodborne illnesses. Sanitation methods, hygienic work environments, and proper food handling and preparation are regarded as fundamental prerequisites for producing safe food.

Good hygiene and sanitation are paramount to preventing food contamination and foodborne illnesses. Directives from CDC (2020a), FSAI (2020), UNICEF (2020), and research conducted by Soares et al. (2012) emphasized that hand washing for at least 20 seconds is very important in food preparation to prevent contamination. Meanwhile, a study found that jewelry may harbor bacteria, so wearing them even during food preparation may contribute to the contamination of the ingredients (Fagernes and Lingaas, 2009; Patel, 2018). Another study by Todd et al. (2010) confirmed that always wearing gloves when preparing food at home prevents bacteria that cause foodborne diseases and avoids contact with potential sources of pathogens that can contaminate food (Agustina et al., 2013; Devamani et al., 2014; Nizame et al., 2016). In the study by Limon (2021), it was found that almost half of the respondents practice personal hygiene when preparing food at home, like washing hands before and after preparing food, washing hands after handling garbage, covering their mouth when sneezing and coughing, and changing clothing and apron when they get dirty, which are sometimes practiced. With these ratings, it is evident that the respondents of the mentioned study practice proper hygiene.

Proper hygiene and sanitation are a must for every food handler to keep away bacteria and germs. To ensure that food is made and delivered to consumers safely, it is necessary to place a high priority on proper hygiene because poor hygiene contributes to foodborne diseases (Azanaw et al., 2018; Carstens et al., 2019), and its consequences may even result in death among consumers (Feltes et al., 2017; Fung et al., 2018; WHO, 2020c).

One of the major courses in Marinduque State College (MSC), Philippines, that offers practical instruction is the Bachelor of Science in Industrial Technology (BSIT) – Food Technology. Considering the drastic changes in the education system caused by the current Corona Virus Disease 19 (COVID-19) pandemic, lectures and performance/ laboratory classes have shifted from the classroom to the home, which has been a challenge to all instructors, especially in the conduct of laboratory classes. As the College has implemented flexible blended learning as a response to the strict protocols, thereby ensuring instruction continuity, one of the strategies of the course is to provide the students with performance activities in such a way that they will be able to showcase their skills and expertise in food preparation. Students have been required to submit a full video record of their performance: from the preparation of food to serving.

Given the current learning setup, a lack of resources and means at home posed concerns to the students, leading to improper food handling and poor hygiene and sanitation. With few studies on food hygiene and sanitation in the new normal, this study sought to determine the knowledge, attitudes, and practices of the BSIT Food Technology students in these areas.

Methods

This study employed a mixed method type of research to determine the levels of knowledge, attitudes, and practices of the students towards food hygiene and sanitation in the context of flexible blended learning.

The study was conducted among purposively selected 20 Bachelor of Science in Industrial Technology major in Food Technology students from Marinduque State College, Philippines, who are enrolled in the Culinary Arts subject for the First Semester, Academic Year 2021-2022. The questionnaire that was used in gathering the data needed for the study was adapted from Abdul-Mutalib et al. (2012). The respondents were asked to rate their agreement with the statements using a 4-point Likert scale. Open-ended questions were also provided in the instrument to ask about their experiences during their laboratory classes in a

flexible blended learning setup. All the responses were subjected to tabulation, statistical analysis, and interpretation. The assessments made were able to evaluate the knowledge, attitudes, and practices of the students on food preparation, reheating food, food storage, working area, handling raw and cooked food, and others.

Results and Discussion

Knowledge of Food Hygiene and Sanitation

This part tried to determine the knowledge of the students about proper food hygiene and sanitation. The participants were requested to rate their knowledge as regards this area using the 4-point Likert scale.

Table 1. BSIT in Food Technology Students' Knowledge of Food Hygiene and Sanitation

Statement	Weighted Mean	Categorical Responses	Verbal Interpretation	Rank
1. Food poisoning is more likely to occur when food is prepared ahead of time.	2.95	Agree	High	5
2. Food contamination is more likely to occur when food is reheated.	2.85	Agree	High	6
3. Consumers are more likely to contract the foodborne disease if cleaning and sanitization procedures for equipment (refrigerator, slicing machine, mincer) are not followed correctly.	3.55	Agree	High	4
4. Washing hands before handling food reduce or limit the risk/chance of contamination.	3.8	Strongly Agree	Very High	1
5. When handling food, wearing gloves reduces the danger of infecting customers and employees.	3.8	Strongly Agree	Very High	1
6. Food contamination can be reduced by wearing a cap, mask, protective gloves, and appropriate clothing.	3.75	Strongly Agree	Very High	2
7. To avoid food spoiling, it is critical to know the temperature of the refrigerator/ freezer.	3.75	Strongly Agree	Very High	2
8. Consumers may be exposed to health risks as a result of improper food storage.	3.6	Strongly Agree	Very High	3

Table 1 shows that most students are very knowledgeable about proper hygiene and sanitation in food handling. Most of the results revealed a "Very High" knowledge of the students regarding the washing of their hands, the use of proper clothing, and the proper storage of foods, which indicates their high level of knowledge of general sanitary measures. Proper attire and the use of Personal Protective Equipment (PPE) such as caps, masks, and gloves while handling food have been very much regarded by the students. This practice has been noted by their instructors through the recorded video presentations of food preparation performed by the students during their laboratory classes. In connection with this, Todd et al. (2010) confirm that wearing gloves at all times when preparing food at home prevents bacteria that cause foodborne diseases and avoids contact with potential sources of pathogens that can contaminate food (Agustina et al., 2013; Devamani et al., 2014; Nizame et al., 2016 as cited by Limon, 2021).

Contrary to this, Liu and Su (2006) state that gloves can also become a source of contamination through contact with raw materials and other kitchen surfaces. As emphasized by one of the respondents, there are times that he makes use of two or more gloves if necessary to avoid food spoilage. However, some of them said they rarely use gloves due to the limited budget that they for preparing their dish and other output needs. Meanwhile, the respondents also demonstrate "Very High" knowledge of proper storage procedures at the right temperature. To avoid cross-contamination, it must be noted to keep raw foods from ready-to-eat and cooked foods and store raw foods below ready-to-eat and cooked foods. Lack of knowledge of this may lead to food contamination and allow the growth of microorganisms (Abdul-Mutalib et al., 2012).

Attitudes toward Food Hygiene and Sanitation

The respondents were also asked to rate their attitude toward food hygiene and sanitation.

Table 2. BSIT in Food Technology Students' Attitudes toward Food Hygiene and Sanitation

	Statement	Weighted Mean	Categorical Responses	Verbal Interpretation	Rank
1.	Before beginning working, make sure the work area is clean.	3.85	Strongly Agree	Very Positive	1
2.	Wash hands before working.	3.85	Strongly Agree	Very Positive	1
3.	It is best to avoid working with filthy hands.	3.55	Strongly Agree	Very Positive	4
4.	Cover the mouth and the nose when coughing or sneezing.	3.65	Strongly Agree	Very Positive	3
5.	The apron can also be used as a hand towel.	2.2	Disagree	Negative	7
6.	Smoking is prohibited while working.	3.8	Strongly Agree	Very Positive	2
7.	Do not rub your hands on the face, hair, etc., while working.	3.65	Strongly Agree	Very Positive	3
8.	Jewelry (including wedding ring) and a watch can be worn while handling food.	2.1	Disagree	Negative	8
9.	A single towel can be used to clean a variety of surfaces.	1.55	Disagree	Negative	9
10.	It is not necessary to separate raw and cooked foods.	1.35	Strongly Disagree	Very Negative	10
11.	Raw and cooked food must be prepared with separate cooking utensils.	3.65	Strongly Agree	Very Positive	3
12.	Food that has been defrosted should not be frozen again.	2.8	Agree	Positive	6
13.	Food should not be handled by a person who has a wound on their hand.	3.35	Agree	Positive	5

Results in Table 2 show that the attitudes of the students toward food hygiene and sanitation are mostly "Very Positive". Most students have positive attitudes toward most aspects, such as clean working areas, hand hygiene, and food preparation. Based on the responses of

some of the students, improper handling and preparation before working should be avoided and prohibited, and as much as possible, the use of separate cooking utensils must be practiced in order to avoid food contamination. Abdul-Mutalib (2012) states that using the same kitchen utensils in preparing food can cause cross-contamination between raw and cooked or ready-to-eat food. On a similar note, CDC (2017) and Xuan et al. (2018) confirm that cutting raw meat and chopping vegetables using the same board and knife may result in cross-contamination. Hence, the use of separate cutting boards and knives for fresh produce, raw meat, poultry, seafood, bread, etc., must be put into practice.

Although the students strictly adhere to general sanitary measures, most of them stated that they could not avoid using the same home kitchen utensils while preparing or cooking because they lack the necessary tools, utensils, and equipment at home to prepare their output (dish) during laboratory classes. However, they still ensure that the utensils are washed and cleaned before being used for other ingredients or dishes.

Consequently, having limited or no access to equipment and other kitchen utensils has greatly affected students' performance during laboratory classes, which also caused them distress. Some of them also claimed that they had experienced extreme stress because they worried too much that they would not be able to comply with all the requirements of the subject and pass the course. Meanwhile, some added that it has never been easy for them to buy the raw materials needed for their dish due to financial constraints. Such presented concerns are some of the challenges these students have encountered in the new normal learning during their laboratory classes. In response to these challenges, laboratory instructors advised their students to use alternative kitchen tools that were readily available and accessible at home. They also allowed the students to explore alternative ingredients in preparing their dish, however, without compromising the quality of its overall sensory attributes.

Practices toward Food Hygiene and Sanitation

The practices of the respondents as regards food hygiene and sanitation were also determined as presented in Table 3.

Table 3. BSIT in Food Technology Students Practices toward Food Hygiene and Sanitation

	Statement	Weighted Mean	Verbal Description	Rank
1.	I clean the work area/space before I start working.	3.7	Strongly Agree	2
2.	I wash my hands before I begin working.	3.75	Strongly Agree	1
3.	I cover my mouth and nose with a handkerchief or tissue when coughing or sneezing.	3.4	Agree	3
4.	I chew gum or eat food while working.	1.6	Disagree	9
5.	I use my apron as a towel to clean my hand.	2	Disagree	6
6.	I smoke while preparing and handling food.	1.35	Strongly Disagree	13
7.	I rub my hands on my face, hair, etc. while preparing and handling food.	1.45	Strongly Disagree	11
8.	I wear accessories while working.	1.4	Strongly Disagree	12
9.	I use the same towel to clean other surfaces.	1.5	Disagree	10
10.	I do not separate raw food from cooked food.	1.7	Disagree	8
11.	I use separate kitchen utensils in preparing raw and cooked food.	3.25	Agree	4

Statement	Weighted Mean	Verbal Description	Rank
12. I do not refreeze defrosted foods.	2.25	Disagree	5
13. I get my hands on food with a wounded hand.	1.9	Disagree	7

This table shows that the students practice general sanitary measures during their laboratory class. Most of the respondents have good practice in cleaning the working area and washing their hands before working. Hand washing for at least 20 seconds is a paramount practice in food preparation to prevent contamination (CDC, 2020, FSAI, 2020, UNICEF, 2020, Soares et al., 2012). On the other hand, pieces of jewelry may harbor bacteria, so wearing them even during food preparation may contribute to the contamination of the ingredients (Fagernes and Lingaas, 2009; Patel, 2018). This malpractice may pose a risk of causing foodborne diseases. Any kind of jewelry could fall into the food during the production and/or preparation stages, posing a choking hazard and perhaps resulting in biological contaminants. Meanwhile, using a face mask or spit guard as a mouth cover is a general practice for the students. Agot (2020) emphasizes that saliva from the food handlers may fall into the food when they sneeze and/or cough, which may cause contamination and the spread of diseases if they do not use a mouth cover. Giving importance to personal hygiene by the students is necessary to ensure that the food is safely prepared for consumption. Some studies show that poor hygiene is a contributory factor to foodborne diseases (Azanaw et al., 2018; Carstens et al., 2019), and its consequences may even result in death among consumers (Feltes et al., 2017; Fung et al., 2018; WHO, 2020c).

Conclusion

This study aimed to determine the levels of knowledge, attitudes, and practices of the purposively selected 20 BSIT Food Technology students toward food hygiene and sanitation in the context of flexible blended learning. Considering that the new learning setup has posed concerns to these students to keep up with their laboratory classes, the findings of this research identified that the students still show a high level of knowledge and attitudes, as well as proper food handling and preparation practices during their laboratory/performance activities. This results in a very positive impact on the overall knowledge, attitudes, and practices of the students toward general sanitary measures, thereby preventing foodborne illnesses caused by contaminants from food handling malpractice, even in the context of the new normal learning landscape.

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