

Place of Food Safety Education in the Philippine K to 12 Curriculum

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Cases of school-aged children affected by foodborne diseases (FBD) are frequently reported, and this increasing rate of affected children is attributed to malpractices in food preparation and production. These malpractices are not only committed by the said population but are also done by businesses affiliated to schools and those by the school personnel. Thus, the study investigated the place of food safety education (FSED) topics in the present K to 12 Curriculum of the country. It explored the multiple dimensions of the 2016 curriculum guides (CGs) that contain topics on food handling and preparation. A qualitative design was used in the situational analysis, which utilized various data collection and analysis techniques through participant interview, focus group discussion (FGD), and analyses of documents to provide information about where FSED as a topic is being integrated into the Intermediate (4–6), Junior (7–10), and Senior (11–12) High School subjects. Three food safety experts (FSEs) were purposively selected for the study. All of the FSEs are female and have experience working in the academe and industry. They reviewed and examined the CGs consisting of 600 pages for a period of 5 mo using an evaluation tool. As revealed, out of the 2,426 topic bodies in the assessed CGs, there are only 490 food safety (FS) topics, which only account for 20.20% of the total topics for all the subjects identified to have revealed traces of FS concepts and practices. Also, the CGs have no detailed specifications on the sub-topics to be discussed, FSED is not provided with an adequate learning space in the Philippine curriculum; rather, it is treated in a separate, scattered, and disconnected manner, positioning it at the margins of the curriculum. Therefore, the curriculum should provide a dedicated space focusing on FSED. This way, the identified weaknesses by the research in terms of conceptualization and implementation of FS-related topics could be satisfactorily addressed.

Keywords: curriculum evaluation, curriculum guide, food safety, K to 12 Curriculum, Philippines

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INTRODUCTION

FS is a significant component for sustainable development. Any issue pertaining to FS in one country can put others at risk; this is because of the significant impact of FS on the globalization process (Scott 2003; Zanin *et al.* 2015). Production, processing, distribution, and marketing are the focus of the globalization process that seeks to meet the growing demands of the global population. The lack of knowledge and education about FS can lead to failures characterized by the existence of physical, chemical, and biological hazards that could have mild to fatal ramifications both locally and globally.

In the academe, FSED primarily aims to protect the food supply from microbial, chemical, and physical hazards or from contamination that may occur during different stages of the food supply chain (Al-Sakkaf 2013). More often than not, FSED is a part of the college-level curriculum in food microbiology class (Jackson-Davis *et al.* 2015; Zhou *et al.* 2014). However, when an individual reaches adulthood, changing habits in preparing food that have been practiced for many years becomes difficult. Therefore, the K to 12 curriculum – especially with an emphasis on 21st-century skills such as health and wellness literacy and public health and safety – should prioritize the inclusion of FSED in Basic Education, particularly in High School (Diplock *et al.* 2019; Jackson-Davis *et al.* 2015; Yu *et al.* 2018). This is important as there are significant people, teenage students in particular who die of FBD annually, and food-related poisoning outbreaks as reported by Abbot *et al.* (2009) and the US Centers for Disease Control and Prevention (CDC 2014).

FSED is considered as an effective way of cultivating acceptable knowledge, attitudes, and practices on food preparation and consumption toward developing positive food handling behaviors (Albin 2015; Yu *et al.* 2018; Zhou *et al.* 2014). Increased FSED and training have been recognized as the key in controlling or eliminating the majority of food-related illnesses and deaths (Atif 2019; Lubos 2014; McFarland *et al.* 2019; Medeiros *et al.* 2011). According to Haapala and Probart (2004), understanding and consistent application of appropriate food handling and preparation techniques will help prevent the occurrences of FBD – a statement supported by the CDC (2015), Doyle *et al.* (2015), McFarland *et al.* (2019), Yu *et al.* (2018), and Zuraw (2013).

In the Philippines, persons at risk for these kinds of outbreaks typically belong to the workforce and guests of social gatherings. Major contributory factors in the occurrences of this type of outbreak are improper storage temperature and poor hygienic practice. Furthermore, educational institutions – particularly in basic education – also recorded cases of food poisoning among students.

In order to prevent these incidents, the Department of Education (DepEd) issued policies that required the strict implementation of food sanitation directives, which should be one of the significant priorities of school heads. Food poisoning reports in the country prove that these incidents are common in big gatherings and in school canteens. In practice, foods are prepared in large quantities and are packed/packaged in abundance poses potential hazards to the consumers. Also, numerous FBD outbreaks in the Philippines have been attributed to poor FS standards, lack of enforcement, and lack of FSED (Atif 2019; Pascual and Abenis 2016; Rustia *et al.* 2017; Toledo 2015).

In 2013, the Philippines has shifted its curriculum from a basic education curriculum to the K to 12 program. It shifted to its new curriculum due to the fact that it is the only country in Asia with 10 years of basic education, there are many non-practical subjects in the previous curriculum, its students are not prepared for college education, its graduates are too young for the labor force, and its system garnered no global recognition. The K to 12 program covers Kindergarten and 12 years of Basic Education, six years of Primary Education, four years of Junior High School; and two years of Senior High School (DepEd 2011). The identified subjects that tackle FS in the present curriculum are *Edukasyong Pantahanan at Pangkabuhayan* (EPP) [Home Economics and Livelihood Education (HELE)]; General Science, Biology, and Chemistry; Technology and Livelihood Education (TLE) such as Agriculture and Fishery Arts (AFA) and Home Economics (HE); and Health Education. EPP is included because of its preparation of elementary pupils in food preservation and cooking towards home and family living. Science discusses the microbiological aspect and concepts such as microorganisms and pathogens that cause food diseases with AFA and HE focus on food production, food handling-growing topics in particular with harvesting, processing, transporting, preparing, distributing, and storing. Moreover, FSED is incorporated in Health Education – particularly in Personal Health; Nutrition, Safety, and First Aid; and Injury Prevention. Furthermore, important FS competencies such as food purchase, preparation, cooking, serving, and storing are emphasized in the K to 12 curriculum. Likewise, K to 12 students fail to recognize or consider the educational opportunities and career in FS.

There have been various reports throughout the Philippines that identified the primary sources of FBD (caused by bacteria, pathogens, and microorganisms) outbreaks related to multiple food dishes, meat-based dishes, fish and other seafood dishes and products, toxin-containing or inedible materials, noodles and pasta, bakery and confectionary products, and rice and root crops (Azanza *et al.* 2018) affect the school-aged children to adults. On

the other hand, food service eating facilities such as school canteen, restaurants, and hotels are secondary sources of FBD outbreaks with 74 occurrences, 4,956 cases, and 31 mortalities (Azanza *et al.* 2018).

FS practices in schools may be categorized into three. The first is on good personal hygiene that includes hand washing, personal cleanliness, personal behavior, illness, and injuries. The second is on food preparation that includes receiving, preparing, handling, cooking and heating, storage, and display. The third is on setting up food premises.

In the Philippines, there are also a number of interventions that are implemented in the academe in order to enhance the awareness of school-aged children and high school students on principles of FS and proper food handling techniques. In fact, in April 2005, the DepEd issued Order No. 14 (DepEd 2005) – also called the “Instruction to Ensure Consumption of Nutritious and Safe Food Schools” – which enforces the following provisions: food items for sale should include natural or fortified food products; parents should be encouraged to pack snacks for their children; parents and the local government units must be involved in regulating the sale of food and beverages by ambulant vendors; the level of awareness on the importance of FS of school children should be increased through the integration of fundamental messages and concepts in the basic education curriculum; and school heads should intensify advocacy on FS to ensure strict implementation of all appropriate measures in the schools. Apart from these provisions, the order also sought to design an FS handbook, which would later on be distributed to schools to function as a reference material – an intervention that was not realized.

However, only a few years after the issuance and supposed compliance of the said order, the occurrence of food poisoning incidents was reported in different public schools, including the city divisions of Antipolo and Rizal (Ronda 2008). The persistence of such health threats in public schools indicates the insufficient efforts in carrying out FS measures by assigned management committees in the various dimensions of the academe – region, division, district, and school. As a result, a monitoring team was then tasked to ensure that the schools strictly conform to hygienic practices and to the quality standards in handling and serving food (DepEd 2005, 2008).

Recently, the DepEd issued Order No. 13 – “Policies and Guidelines on Healthy Food and Beverage Choices in Schools and in DepEd Offices” – that primarily aims to promote and develop healthy eating habits among the youth and DepEd employees “by making available healthy, nutritious, and affordable menu choices, and for setting food standards” (DepEd 2017). However, it

does not aim to increase the awareness of food handlers, students, and other stakeholders in the academe regarding FS practices. It only includes a standard in the evaluation and categorization of foods and drinks that are sold and consumed within the school community.

Despite directives and issuances from DepEd that sought to battle and, eventually, decrease the prevalence of FBD in public schools, many learners and teachers are still at risk or vulnerable to FBD. The challenges that the FS implementers are faced with the decreasing prevalence of FBD include lack of coordination and monitoring between and among the personnel in the national and local government offices and schools, as well as inadequate auditing tools on the inspection of the consigned foods before serving or vending them at the canteen. The DepEd urged the school head and school personnel to strictly abide by the FS policies to ensure that the learners are safe from any health risk from FBD. Moreover, school division superintendents are advised to monitor the effective and efficient management of the school canteens. Likewise, the parents and guardians are encouraged to guide and cultivate skills in selecting food wisely and practicing personal hygiene and food sanitation (DepEd 2017).

While the DepEd had repeatedly called for the promotion of FS, implementation gaps still exist and there seems to be a lack of support for a long-term solution to the occurrence of increasing cases of food-borne diseases in the schools. Very few seminars and workshops on FS have been available for both teachers and students in public schools where most cases of FBD had been reported (Diplock *et al.* 2017; Diplock 2018; Mushrush 2017; Webb and Morancie 2015). In addition, the FS programs need to involve the participation of parents who play a key role in household food preparations. They also take care of children’s practice at home and the food they ought to bring to school. Studies reveal that topics on developing ethical and standard food handling practices, when taught to learners at an early age, can result in lifelong learning (Albin 2015; Diplock 2018; Slater 2013; Young *et al.* 2015; Zhou *et al.* 2014).

This present condition of FS in schools necessitates assessing the place of FSED in the current curriculum of the country. Studies reveal that topics on developing ethical and standard food handling practices, when taught to learners at an early age, can result in lifelong learning (Haapala and Probart 2004; Youatt *et al.* 1996). This study aimed to investigate the place of FSED in the present K to 12 curriculum of the country. Also, it specifically sought to identify and assess what topics on FS are included and/or integrated into the K to 12 curriculum.

METHODS

Research Design

Qualitative methods approach was used for this study. It attempts to assess the place of FS in the K to 12 curriculum by employing qualitative methods to collect data from various sources and by analyzing through descriptive statistics and content analysis.

Locale of the Study

The study was conducted in the Philippines where pertinent documents were examined to determine if FS topics were incorporated. These documents include the K to 12 Basic Education program CGs in Elementary, Junior, and Senior High School in subjects such as EPP, Sciences, TLE, and Health Education.

Informants

Three Filipino FSEs were invited to identify the related topics on FS in the K to 12 CGs. These experts were affiliated with international organizations and had occupied positions in various professional organizations, research agencies, and universities. The three participants are professionals, graduates, and experts in the field of FS. All of them have master's degrees. They either work for a food development center, national pilot food plant, or a university. However, one expert had signified withdrawal as a member of the pool of experts due to personal and health reasons. The length of their participation lasted for five months during the first quarter of 2019.

Research Instrument

A researcher-made CG assessment tool was utilized by the FSEs to assess the current place of FSED in the K to 12 curriculum of the Philippines. FSEs used the 2016 CGs of the following subjects in the Grades 4–6, 7–10, and 11–12 in the following subject areas: EPP [HELE], Science (including General Science, Biology, and Chemistry); TLE (including AFA and HE); and Health Education where FSED are identified.

The research instrument used in this study involved three parts. The first part of the instrument describes the curriculum profile that requires the participants to write the details on the CGs they are evaluating. Part two is where FSEs can specify the FS topics embedded in the K to 12 CGs. It is divided into three columns. The first column contains the identified subjects, which are related to FS. In the second column, participants specify the grade level. Then, in the third column, the participants were required to write the FS topics that they were able to identify in the CG. Every FS-related topic from the CG that is listed in the third column is counted as one. The

number of topics indicated in the third column served as the basis of knowing, the extent to which FS topics are included in the CG.

Part three is an interview guide that contains seven open-ended questions aimed to determine the FS-related topics embedded in the present curriculum and to find out why these topics were integrated into the CG. The three experts were interviewed to validate data gathered from the instruments they submitted and to come up with one decision.

Prior to its use in collecting data for this study, the researcher-made instrument was subjected to face and content validation by experts to ensure that it can effectively gauge what it is intended to measure. Also, the instrument was pilot-tested to ten individuals who were purposively selected and who were not members of the sample. These ten individuals are the five food science, health education, science, and home economics professors and teachers; two curriculum specialists; two TLE supervisors; and one science head teacher. Comments of the experts were considered and incorporated in the final instrument. The researcher ensured that the instrument was clear and understandable prior to the distribution to the participants.

Ethical Considerations

The study was granted an ethics clearance from the Far Eastern University–Nicanor Reyes Medical Foundation Institutional Ethics Review Committee with reference number 2018-0012. Having accomplished the needed documents and transactions, the researchers conducted an orientation with the selected participants individually, after which informed consent was obtained and discussed with participants.

Data Gathering Procedure

Data was gathered and examined through document review and analysis of experts, interviews with participants, and FGD. An analysis of the K to 12 Junior High School CGs in EPP, Health Education, Sciences, and TLE was conducted to gather necessary information on what topics are included or integrated, and to what extent these topics are aligned with the international standards on FS. FSEs utilized their knowledge and experience in the industry and academe using the researcher-made instrument in assessing whether a topic in the CG was related to FS. After which, they recommended that topics on FS are to be included and interviews are made. Also, the FSEs gave detailed and pertinent suggestions and recommendations to improve the status and place of FSED in the curriculum. Moreover, notes from the recorded interview and FGD were utilized in the data analysis.

Data Analyses

The existing topics on FS in the CGs were analyzed by employing qualitative methods. Descriptive statistics was used where frequency counts and percentages were performed to determine the number of topics related to FS in the K to 12 CG. Topics on FS in the K to 12 CGs were clustered according to their respective components. Results of the interview, FGD, and document analysis were reported using the manual coding method and then analyzed qualitatively through content analysis. The result of the interview with the FSEs was coded and then classified into sub-themes. From there, themes were obtained that framed the analysis and interpretation of the study.

RESULTS

After data has been gathered and tabulated, results of the analysis and interpretation of findings were presented to answer the objectives posted in this study.

Topics on FSED that were Included and/or Integrated into the K to 12 CGs

The researchers, in consultation with FSEs, conducted a document analysis where CGs consisting of 600 pages were reviewed and examined by utilizing a researcher-made evaluation tool for a period of five months.

Appendix Table I presents the frequency of FS-related topics in the K to 12 CGs. They are organized according to themes, sub-themes, codes, subjects, and grade levels based on the assessment performed by the researcher and the FSEs. As shown, these are categorized into three themes – namely, 1) prerequisite programs of FS, 2) food and safety quality, and 3) Philippine food laws.

Prerequisite programs of FS. As for the first theme, it was divided into three sub-themes (Appendix Table I). The first sub-theme deals with Good Agricultural Practices (GAP) with two subjects and grade levels, which are EPP 5–6 on Agriculture obtaining a frequency of two of five or 20% and TLE 9-10 on AFA Food Processing obtaining a frequency of eight of ten or 80%. GAP, as defined by the Food and Agriculture Organization (FAO 2016), is a collection of principles in applying for on-farm production and post-production processes that will result in healthy and safe food and non-food agricultural products while taking into consideration the economic, social, and environmental sustainability.

Good Manufacturing Practices (GMP), according to the Food and Drug Administration (FDA 2019), is a system that assures proper design, monitoring, and control of manufacturing processes and facilities. GMP,

on the other hand, consists of six codes. The first code includes Personal Hygiene, which is embedded in TLE 9–10-HE-Bartending and AFA-Food Processing, which both obtained a frequency of four of eight or 50%. The second code pertains to Environmental Hygiene, which includes Plant and Grounds. A total of 14 topics under five subjects were identified for this code. TLE 9–10 ranges from HE-Bartending obtained four out of 14 or 23.52%, AFA-Food Processing three out of 14 or 17.64%, HE-Fish Product Packaging four out of 14 or 23.52%, and AFA-Slaughtering Operations one out of 14 or 5.88%. AFA-Fish Capture obtained two out of 14 or 11.76% intended for TLE 1–12. It is worthy to note that under the third code on Design and Sanitary Construction of Buildings, Equipment, and Facilities, it appeared that there was only one topic intended for TLE 9–10, which is AFA-Food Processing.

The fourth code under GMP (Appendix Table I) – which is Storage, Warehousing, and Transportation – contains 73 topics under nine identified subjects. The topic on AFA-Food Processing under TLE 9–10 obtained the highest frequency of 26 out of 73 or 35.61%, followed by HE-Commercial Cooking under TLE 7–10 with a frequency of 23 out of 73 or 31.50%. The least identified topic is HE-Fish Product Packaging for TLE 9–10, which obtained a frequency of one out of 73 or 1.36%.

On the fifth code (Appendix Table I), under Maintenance and Sanitation, a total of eight topics under three subjects were identified. The topic on AFA-Food Processing obtained a frequency of six out of eight or 75% under TLE 9–10, while both HE- Bartending and HE-Cookery under TLE 9–10 and TLE 7–10, respectively, obtained a frequency of one out of eight or 12.5%. Examining the last code on Process and Production Controls, a total of 155 topics under nine subjects were identified. The topic on AFA-Food Processing in TLE 9–10 attained the highest frequency of 66 out of 155 or 42.58%. The topic on Agriculture for EPP 5–6 got the lowest with a frequency of one of 155 or 0.65%.

Looking at the third, the sub-theme in Appendix Table I – Cleaning and Sanitation Standard Operating Procedures (SSOPs) – a total of 96 topics under 11 subjects were determined. The topic AFA-Food Processing attained the highest frequency of 29 out of 96 or 30.20% under TLE 9-10, while the topic HE-Commercial Cooking taken in TLE 7-10 got a frequency of one out of 96 or 1.04%. As reflected in the table, topics such as Health Education 8 and 9 were also identified by FSEs. Prevention and control of diseases both communicable and non-communicable diseases are the focus for Grade 8, while community and environmental health is the emphasis of the Grade 9 Health Education curriculum.

FS and quality. The second theme refers to FS and Quality. From this, a total of 95 topics under 15 subjects were identified (Appendix Table I). Topics on AFA-Food Processing were repeatedly identified by FSEs, which obtained the highest frequency of 20 out of 97 or 21.05%. Agriculture under EPP 5–6 consistently got the lowest with a frequency of one out of 95 or 1.05%. AFA-Food Processing is one of the subjects in the K to 12 curriculum that is described as the conversion of any agricultural and fishery products to substances that have nutritional, textural, and sensory properties using acceptable methods. Interestingly, General Science, Biology, and Chemistry topics were also identified in the theme.

Philippine food laws. The third and last theme revolved around Philippine food laws that present provisions on FS. As observed, there are few laws concerning FS in the Philippines. As gleaned from Appendix Table I, 28 topics under six subjects were identified in the said theme. Consistently, AFA-Food Processing under TLE 9–10 obtained the highest frequency of eight out of 28 or 28.57%. Both HE-Bartending and Marine Specialization under TLE 9–10 and TVL 12 respectively attained the lowest frequency of one of 28 or 3.57%.

According to one of the FSEs, “the strength of the [existing] curriculum is that it does include aspects of FS [in the lesson coverage], and [the curriculum] recognizes the importance [of these aspects] in the teaching of courses involving food handling and preparation” (FSE 1). Such recognition of FS-related topics in the curriculum is expected to lead to the prevention of FBD and other health risks resulting from the unsafe consumption of food. Considerable attention is directed to the concept of FS as an integral component of food security in the country because unsafe food propels a cyclical process of disease formation and malnutrition – especially in Filipino infants, young children, teenagers, and the elderly. Designated government agencies such as the Philippine FDA, Department of Health, Department of Agriculture, and local government units monitor the implementation of FS standards in local and national markets and, thus, ensure that what people consume are healthy and essentially free from organisms that may result in diseases. Although several measures have been executed by the government to push forward its aim to lessen – if not eradicate – cases of illnesses and mortality reports resulting from malpractices in food preparation, the majority of Filipinos are still uneducated when it comes to FS competencies. Likewise, food-related health standards must be recognized in the education sector. In addition, the teaching of FSED is not prioritized in the curriculum but rather integrated into other subject areas. Moreover, the present curriculum presents “a lot of weaknesses that need to be addressed” (FSE 2).

FSE 1 went on to say that “topics covered in the curriculum would have to be appropriately arranged from the basic to the complex, with [identified] gaps filled in, and [should] only include what is truly relevant to the course” (FSE 1). This is an interesting finding because the K to 12 curriculum implementation has institutionalized a curricular framework anchored on a spiral progression approach (Samala 2018). Here, the overall design of Grades 1–10 curriculum follows the spiral approach across subjects by building on the same concepts developed in increasing complexity and sophistication. However, in the document analysis of CGs, it was revealed that the treatment on FSED – across the various subjects in which its traces were separately found – does not follow the simple-to-complex sequence approach. According to Bilash (2009), a properly sequenced set of lessons on a particular course or subject allow for smoother transitions between lessons, improved facilitation of scaffolding strategies, and an optimized learning environment for the students.

These observations were supported by FSE 2 who further argued that there were no formulation and presentation of general objectives about the FS topics included in the CGs. Hence, expected learning outcomes are also not explicitly detailed. She explained that “since the objectives of the course were not specified, as to awareness, understanding, knowledge-building,” (FSE 2) the FS-related content found in the CGs examined were not anchored on available national and international standards. Well-written learning objectives can provide a concise depiction of the outcomes or of the performances that are expected of the learners as a result of their learning acquisition or skills development. Apart from this, learning objectives clarify the intent of instruction and serve as a framework for the formation of pedagogical activities (Herring and Williams 2000). Without explicitly stated learning objectives on the FS components in the assessed CGs, understanding the extent of learning among the students when it comes to FSED remains unclear and, therefore, not properly accounted for.

It can be gleaned from Appendix Table II that in the elementary level, only four FS topics are integrated into their subject, EPP – specifically on the components, Agriculture and Home Economics. One topic per component is spread out in each grade level. This is because the focus for Elementary EPP components is more on training the pupils for basic GAP, and home and family living. For the High School level, it can be observed that there are 13 subjects, which include FS topics. These subjects are 1) Bread and Pastry Production, 2) Bartending, 3) Cookery, 4) Commercial Cooking, 5) Fish Product Packaging, 6) Food and Beverage Services, 7) Food Processing, 8) Ship’s Catering Services, 9) Fish Wharf Operation, 10) Slaughtering Operations,

11) Fish Capture, 12) Health Education 7–10, and 13) Science 7–10. The table further shows that three TLE components yielded more than half the number of FS topics: Slaughtering Operation has 58.06% or 36 FS related topics out of the 62 total number of topics written in the CG; Food Processing has yielded 173 (57.66%) topics directly associated to FS out of the 300 total topics included in the subject; finally, Fish Wharf Operations that has a total number of 39 topics include 21 topics (53.85%) that deal with FS.

Ship's Catering Services (38 out of 87 or 43.68%) and Fish Product Packaging (48 out of 136 or 35.29%) have listed topics in FS that are almost half the total number of topics taken up in the subjects. Appendix Table II also shows that Commercial Cooking (47 out of 306 or 15.39%) has a lot more topics related to FS than Cookery (26 out of 322 or 8.07%). This is alarming because Commercial Cooking was already changed to Cookery; in which case, the FS topics included in the former were also removed from the TLE-HE curriculum. Bread and Pastry Production, and Bartending have listed only a few FS topics. Similarly, Health and Science subjects included FS topics whose number barely reached 20% of the total number of topics taken up in said subjects. These subjects have their own concentrations. The topics specific to these concentrations are already compressed to respond to the competencies set in the K to 12 curriculum.

The variation in the number of FS topics in the various subjects assessed by the researcher and the FSEs may also be driven by geographical and socio-economic motivations, aside from educational rationales. It is also apparent in Appendix Table II that there are more teaching-learning topics, thereby more FS-related lessons, embedded in subjects that pertain to AFA. However, recent studies suggest that despite performing relatively well in the 1960s and 1970s, Philippine agriculture faltered in the succeeding decades (Briones *et al.* 2014). At the turn of the century, Philippine agriculture – although it maintains its role as a key player in increasing inclusive growth – was no longer regarded as a major contributor to the Philippines' economic growth (Briones *et al.* 2014). The inclusion of FS topics in learning components that seek to heighten and enrich learners' interest, knowledge, and skills in the field of Agriculture is conceivably a way of the national government to encourage youth participation in safe farming practices – such as organic farming or sustainable gardening – following internationally accepted protocols in the transport of food items from farm to fork, among others. Students develop an inclination toward agrarian services, such as crop production and/or marketing livestock, when they become aware of these FS concepts in Agriculture early on in their schooling. Consequently, they are prepared to take career paths that

lie within the borders of Agriculture and to eventually become specialists who advocate FS systems that are globally accepted and implemented. A report from the Oxford Business Group (2019), a global research and advisory company producing business intelligence on more than 35 countries, supports this claim as it detailed that there are increasing public and private efforts made to move Philippine farming from subsistence to commercial operations – with initiatives to modernize production techniques, harness new technologies, link farmers with national and regional value chains, and expand agricultural innovations into the education sector.

It is also noticeable in Appendix Table II that most topics on FS fall under HE and AFA subjects that deal with components on Fish Product Packaging, Fish Capture, and Fish Wharf Operation. Since the Philippines has a widely dispersed archipelagic landmass surrounded by bodies of water, this tendency of favoring the field of Fishery Arts is expected. Recently, the country has launched a major investment program, which includes a USD 500 million loan from the World Bank and other international credits, to improve agricultural and fisheries production as part of long-term plans to increase rural incomes and boost social development in the country's poorest regions (WFA 2015). Certainly, marine fisheries and aquaculture are priority segments of the national government as the country now ranks 8th in the world among leading fish countries, according to FAO (2018). In order to keep the fishing production and industry commercially profitable, especially for export purposes, the national government should reinforce its international standards on marine commercialization by including or incorporating more FS-related topics in the field of Fishery Arts (Briones *et al.* 2014; FAO 2016, 2018).

Moreover, it has been identified that TLE-HE tackles more FS concepts – namely, in Bread and Pastry Production, Bartending, Cookery, Commercial Cooking, and Ship's Catering Services – than the other subject areas. Prioritizing FS in these components is a strategic move of the national government to train students with globally acceptable practices in food preparation and handling – for the potential pursuit of careers relating to the food and catering industry. In recent years, cooks, bakers, and pastry chefs are becoming the most sought-after professions – with ships, hotels, and restaurants as main employers (Pascua, as cited in France-Pressé 2015). According to data from the Department of Labor (as cited in France-Pressé 2015), nearly 180,000 Filipinos went to work in ship galleys abroad between 2010–2014 – including nearly 72,000 head chefs – with the rest made up of kitchen assistants and waiters. Filipinos are considered to be assets in the global catering industry not only because of their English proficiency but also

because they can easily adapt to the host countries and resilience that belies their easy-going nature (Pascua, as cited in France-Pressé 2015). These professions in the food industry – responsible for food handling and preparation, the forefront of conforming to the standards of FS – are now occupying considerable space in the job options for Filipinos, especially those who dream to work abroad. With the growing attention that these professions are getting, many Filipino students would want to land on these kinds of work after graduation. Having FSED integrated early on in the K to 12 curriculum would give these students the fundamental knowledge and relevant skills on safe handling and preparation that would be beneficial in the aforesaid professions.

DISCUSSION

The findings all directed at disclosing the weak points and gaps of the existing K to 12 curriculum in its treatment of FSED. Both FSEs came to the conclusion that there should be a separate portion in the curriculum that focuses on FSED in order to enhance or strengthen it. The curriculum may include comprehensive teaching and learning, in which FSE 1 highlighted the need to include “visuals and examples from actual events where FS was compromised” so that the students could have “a better grasp of the consequences of *not* complying with FS” (FSE 1). Furthermore, the inclusion of Basic FS topics such as personal hygiene, proper handwashing, wearing of proper protective equipment, sanitation of food contact and non-food surfaces, and discussion of FS Hazards are also recommended. This recommendation was supported by most studies, which include those of Abbot *et al.* (2009), Byrd-Bredbenner *et al.* (2010), and Yarrow *et al.* (2009).

Upon careful review of the K to 12 CGs, it is worth noting as revealed in Appendix Table I, there are no detailed specifications on the sub-topics to be discussed; topics are scattered and are treated independently from each other. In fact, limited topics on FS – namely, SSOPs, FS and quality, and FS Philippine laws – are discussed in Health Education 8–10, General Science, Biology, and Chemistry CGs. Moreover, these FS topics are restricted to and taken by HE majors only. With this problematic treatment and placement of FS topics in the curriculum, it becomes imperative to develop a separate CG that is primarily designed for the delivery of FS education in classrooms, particularly in High School (Diplock *et al.* 2017, 2019; Ovca *et al.* 2018; Shearer *et al.* 2013; 2014).

The aforesaid findings reinforce the issues that emerged in a preliminary work done by the researcher, which traced the presence of FS concepts in the HE CGs. One of the issues that the researchers found out in HE CGs was that

only a few FS topics cater to children between 10–16 yr of age (Abbot *et al.* 2009; Turconi *et al.* 2008); this population – especially the teenagers – should already be exposed to FSED (Diplock *et al.* 2019; Ovca *et al.* 2018; Shearer *et al.* 2013, 2014) as they are now becoming active participants in preparing food for themselves, their community, and the larger society. Teenagers are believed to be mature enough to process cognitive and psychomotor activities and, at the same time, are young enough to modify behavior and nurture a fresh set of habits (Haapala and Probart 2004; Turconi *et al.* 2008). Similarly, studies conducted by Shearer *et al.* (2014), Simčič *et al.* (2011), and Slater (2013) argue that HE curriculum is considered as the students’ starting point for exploring FS concepts and practices, which are then build upon as students move to other food-related subjects. Furthermore, Slater (2013) reported in his study that a number of administrators, non-HE teachers, and even parents do not give importance to the value HE courses in reinforcing FSED. It is without a doubt that students must be capable of taking action in preventing FBD through FSED, which was supported by the studies of Schafer *et al.* (1993) and Byrd-Bredbenner *et al.* (2013).

It was also found out in the preliminary work of the researchers that there are only a number of FS concepts and areas that are included. Traces of basic concepts on FSED in the CGs are found in the Junior High School, particularly in Grades 9 and 10 CGs. FS-related knowledge and skills are embedded in the various lessons of TLE areas such as cookery, commercial cooking, bartending, bread and pastry production, fish products packaging, food and beverage services, and food processing (DepEd 2016a–g) – mostly all from HE. Topics included in these areas are food handling safety, hand washing, reporting of health condition and illness, sources of food contaminants, FS practices and principles, and serving food at recommended temperature.

An overall look at Appendix Table II clearly shows that out of the 2,426 topic bodies in the assessed CGs, there are only 490 FS topics, which only account for 20.20% of the total topics for all the subjects identified to have revealed traces of FS concepts and practices. The treatment of FSED is inadequate and, therefore, needs enrichment and strengthening in terms of content, teaching strategies, and teaching-learning materials. The FSEs, identified the weaknesses and gaps of the present curriculum when it comes to its treatment of FSED. FSE 1 questioned the extent of GMP and HACCP topics discussed under the courses listed in the CGs, because the said topics are highly technical, so they need a professional intervention when taught to young learners. She added that FS topics in the CGs are not arranged following the scope and sequence approach. These observations were supported

by FSE 2 when she further argued that aside from the fact that the topic body on FSED is insufficient, there were no formulation and presentation of general objectives about FS topics included in the CGs; thus, expected learning outcomes are also not explicitly detailed. Furthermore, the integration of FS topics in subjects like Science and Health Education signifies the “scattered” treatment of FSED in the K to 12 curriculum. Such treatment means that topics of a larger topic can be found in other CGs and grade levels, complex topics are in the lower levels rather than in the upper levels, topics that are necessary for particular grade levels are not included, topics are not organized in a spiral progression across the grade levels, which means that the topics are scattered all over the curriculum from Grades 4–12; thus, topics are not situated in a focused, specialized learning space. Another easily noticeable observation in Appendix Tables I and II is that FS topics are mostly integrated in TLE subjects, specifically in AFA, and HE. The majority of FS topics converge toward these TLE components because of geographical and socio-economic reasons. Since the growth of the Philippine economy relies heavily on agriculture, fisheries, and transnational remittances, the national government mobilizes the education sector to train the Filipino High School students with effective practices in food preparation FS topics in some selected subjects of the K to 12 curriculum, although described as “inadequate” by FSEs, hopes not only to address foodborne outbreaks but also to sustain the socio-economic needs of the country.

CONCLUSION AND RECOMMENDATION

This study aimed to investigate the place of FSED in the present K to 12 curriculum of the Philippines. It also specifically sought to identify and assess what topics on FS are included and/or integrated into the K to 12 curriculum. In summary, the findings revealed the weak points and gaps of the present curriculum in its treatment of FSED. Likewise, the study disclosed that there is a dearth of FS concepts and areas in TLE that are included in the K to 12 CGs. Moreover, it argued that there should be teaching and learning spaces in the curriculum dedicated to the cultivation of knowledge and skills among High School students. Such a proposition hopes to position the educational stakeholders at the forefront in advocating for FS towards a community that is free from foodborne illnesses.

Furthermore, the study revealed that there only traces of basic concepts on FSED in the Junior High School and Grades 9 and 10 CGs. Additionally, it specifically found out that FS-related knowledge and skills are embedded

in the various lessons of TLE areas (Bread and Pastry Production, Bartending, Cookery, Commercial Cooking, Fish Product Packaging, Food and Beverage Services, Food Processing, Ship’s Catering Services, Fish Wharf Operation, Slaughtering Operations, Fish Capture), Health 7–10, and Science 7–10. Topics included in these areas are 1) prerequisite programs of FS – which includes GAP, good manufacturing services, and SSOPs; 2) FS quality; and 3) Philippine food laws. Similarly, the timeframe that is intended for the acquisition and learning of these concepts and skills is not enough. Topics are too general and there are no detailed specifications on the sub-topics to be discussed. Topics included are scattered, treated independently from each other, and do not seem to progress from basic to complex. In addition, the topics are only restricted to those who are majoring in HE, hence, are inaccessible to students who do not specialize in such an area. Therefore, it is recommended that a separate CG and enhancement of the integration of FSED with other subject areas that is primarily designed for the delivery of FSED in classrooms are imperative so that the identified gaps in the present curriculum when it comes to how it positions FS topics could be strategically addressed. Such a curriculum would be offered to High School students as this population is now becoming active participants in food handling and preparation for their households, their community, and the larger society. Also, the study proposed that FS as a topic should occupy a quarter of the academic calendar in order for its subtopics to be discussed intensively.

Lastly, based on the results of the study, the recommendations are proposed. The gaps and weak points in the present curriculum further fortify the necessity to develop an appropriate and a contextualized CG. Future researches should explore developing enrichment activities and evaluation of existing materials, activities, and strategies integrated into the CGs of these subjects in TLE; conducting benchmarking activities to institutions that offer curricula, which provide a focused space for the teaching and learning of FSED so these could be contextualized based on the needs of Filipino educational stakeholders; equipping students and teachers with FSED through consistent training of teachers on FSED for trends and future directions; establishing core groups composed of trained FS specialist; and developing FS related certification exams.

ACKNOWLEDGMENTS

The authors would like to express their gratitude to Assistant Professor Abigail S. Rustia, Ms. Wendy E. Ledda, and Ms. Melissa G. Siena for their patience in

helping the researchers. This project was funded by the COOPERATE (Continuous Operational and Outcomes-based Partnership for Excellence in Research and Academic Training Enhancement) program, which is administered by the Office of International Linkages under the Office of the Vice President for Academic Affairs of the University of the Philippines System (grant ID number 2018-06) and the Philippine Commission on Higher Education (grant ID number 13-10- 0016). Also, the authors would like to thank Prof. John Paul Castillo Vallente for patiently editing the manuscript prior to submission.

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APPENDICES

Table I. Topics that are included in the K to 12 curriculum as assessed by the FSEs.

Themes	Sub-themes	Codes	Subjects and grade level	<i>f</i> of topics	%
Prerequisite programs of FS	Good agricultural practices		EPP 5-6-Agriculture	2	20.00
			TLE 9-10-AFA-Food Processing	8	80.00
				Total	10
					100.00
	Good manufacturing practices	Personal hygiene	TLE 9-10-HE-Bartending	4	50.00
			TLE 9-10-AFA-Food Processing	4	50.00
				Total	8
					100.00
	Environmental hygiene includes plant and grounds		TLE 9-10-HE-Bartending	4	23.52
			TLE 9-10-AFA-Food Processing	3	17.64
			TLE 9-10-HE-Fish Product Packaging	4	23.52
			TLE 9-10-AFA-Slaughtering Operations	1	05.88
			TVL 10-12-AFA-Fish Capture	2	11.76
			Total	14	100.00
	Design and sanitary construction of buildings, equipment, and facilities		TLE 9-10-AFA-Food Processing	3	100.00
			Total	3	100.00
	Storage, warehousing, and transportation		TLE 7-10-HE-Bread and Pastry Production	8	10.95
			TLE 9-10-HE- Bartending	3	4.11
			TLE 7-10-HE-Cookery	3	4.11
			TLE 7-10-HE-Commercial Cooking	23	31.50
			TLE 9-10-AFA-Fish Wharf Operation	2	2.74
			TLE 9-10-HE-Fish Product Packaging	1	1.37
			TLE 9-10-AFA-Food Processing	26	35.61
			TVL 10-12-AFA-Fish Capture	2	2.74
			TVL 12-Marine Specialization	5	7.14
			Total	73	100.00
	Maintenance and sanitation		TLE 9-10-HE- Bartending	1	12.50
			TLE 7-10-HE-Cookery	1	12.50
			TLE 9-10-AFA-Food Processing	6	75.00
				Total	8
					100.00
	Process and production controls		EPP 5-6-Agriculture	1	.65
			TLE 7-10-HE-Cookery	3	1.94
			TLE 7-10-HE-Commercial Cooking	5	3.22
			TLE 9-10-HE-Fish Product Packaging	24	14.19
			TLE 9-10-AFA-Food Processing	66	42.58
			TLE 9-10-AFA-Fish Wharf Operation	13	8.39
			TLE 9-10-AFA-Slaughtering Operations	21	13.55
			TVL 10-12-AFA-Fish Capture	12	7.74
TVL 12-Marine Specialization	10	6.45			
				Total	155
					100.00

Themes	Sub-themes	Codes	Subjects and grade level	f of topics	%
	Cleaning and sanitation standard operating procedures (SSOPs)		TLE 9–10-HE-Bartending	6	9.38
			TLE 7–10-HE-Cookery	10	10.42
			TLE 7–10-HE-Commercial Cooking	1	1.04
			TLE 9–10-HE-Fish Product Packaging	5	5.21
			TLE 9–10-AFA-Food Processing	29	30.21
			TLE 9–10-AFA-Fish Wharf Operation	4	4.17
			TLE 9–10-AFA-Slaughtering Operations	3	3.13
			TVL 10-AFA-Fish Capture	7	7.29
			TVL 12-Marine Specialization	20	20.83
			Health 8	6	9.38
		Health 9	5	5.21	
			Total	96	100.00
FS and quality			EPP 5–6-Agriculture	1	1.04
			TLE 7–10-HE-Bread and Pastry Production	5	5.26
			TLE 9–10-HE- Bartending	2	2.11
			TLE 7–10-HE-Cookery	9	9.47
			TLE 7–10-HE-Commercial Cooking	15	15.79
			TLE 9–10-HE-Fish Product Packaging	9	9.47
			TLE 9–10-AFA-Food Processing	20	21.05
			TLE 9–10-AFA-Fish Wharf Operation	2	2.11
			TLE 9–10-AFA-Slaughtering Operations	4	4.21
			TVL 10–12-AFA-Fish Capture	10	10.53
			TVL 12-Marine Specialization	2	2.11
			Health 10	3	3.16
			Science 7-General Science	10	10.53
			Science 8-Biology	2	2.11
		Science 9-Chemistry	1	1.04	
			Total	95	100.00
Philippine food Laws			TLE 9–10-HE- Bartending	1	3.57
			TLE 7–10-HE-Commercial Cooking	3	10.71
			TLE 9–10-HE-Fish Product Packaging	5	17.86
			TLE 9–10-AFA-Food Processing	8	28.57
			TLE 9–10-AFA-Slaughtering Operations	7	25.00
			TVL 12-Marine Specialization	1	3.57
		Health 10	3	10.71	
			Total	28	100.00
			Grand total	490	100.00

Legend:

EPP	<i>Edukasyong Pantahanan at Pangkabuhayan</i> [Home Economics and Livelihood Education]
TLE	Technology and Livelihood Education
TVL	Technical-Vocational Livelihood
HE	Home Economics
HEd	Health Education
AFA	Agriculture and Fishery Arts

Appendix Table I further shows the following limitations of CG in relation to FS. The following general observations on the limitation of the curriculum in relation to FS is observed: 1) technical topics, such as GMP and Hazard Analysis and Critical Control Points (HACCP), were not given sufficient space in the curriculum in order for them to be taught in a timeframe and a pedagogy that satisfy their technicality; 2) topics covered in the curriculum were not appropriately arranged from basic to complex, hence, the order of topics do not conform to the spiral progression approach; 3) there were no formulation and presentation of general objectives about the FS topics included in the CGs, consequently, learning outcomes were not explicitly detailed; 4) sub-topics to be discussed for every general topic identified were not specified; and 5) topics included are scattered and are treated independently from each other. FSE 2 commented that the present K to 12 CGs deal with only a very small part of the FSED. It is limited to practices and policies that embody acceptable food handling and preparation techniques within and beyond the household. Thus, she recommended that “it would be best to include topics on laying down the prerequisite programs of FS, which include GAP [and] GMP, [and]

FS programs, [composed of] HACCP [and] FSMS” (FSE 2) – a statement that was seconded by the various studies (Diplock 2018; Diplock *et al.* 2019; Motarjemi 2014). Additionally, FSE 1 questioned the extent of GMP and HACCP topics discussed under the courses listed in the CGs because these are technical topics that have to be taught in a timeframe and a pedagogy that satisfy their “technicality.” HACCP is an internationally recognized system for reducing the risk of safety hazards in food (FSTT 2018). A HACCP system requires that potential hazards are identified and controlled at specific points in the process. This includes biological, chemical, or physical hazards. Any company involved in the identified and controlled at specific points in the process. This includes biological, chemical, or physical hazards. Any company involved in the manufacturing, processing, or handling of food products can use HACCP to minimize or eliminate FS hazards in their product (FSTT 2018). GMP, on the other hand, ensures that products are consistently produced and controlled to the quality standard appropriate to their intended use and as required by the marketing authorization (Shukla 2017).

Table II. Distribution of topics according to subject matter.

Subjects	Total number of topics in the CGs		FS topics in the CGs	
	<i>f</i>	%	<i>f</i>	%
EPP 5-Agriculture	6	100.00	1	16.67
EPP 5- Home Economics	2	100.00	1	50.00
EPP 5-Industrial Arts	6	100.00	0	00.00
EPP 6-Agriculture	2	100.00	1	50.00
EPP 6- Home Economics	3	100.00	1	33.33
EPP 6-Industrial Arts	4	100.00	0	00.00
TLE 7-12-HE-Bread & Pastry Production	105	100.00	13	12.38
TLE 7-12-HE-Bartending	223	100.00	21	10.62
TLE 7-10-HE-Cookery	322	100.00	26	08.07
TLE 7-10-HE-Commercial Cooking	306	100.00	47	15.39
TLE 9-10-HE-Fish Product Packaging	136	100.00	48	35.29
TLE 9-12-HE-Food & Beverage Services	98	100.00	0	00.00
TLE 9-10-AFA-Food Processing	300	100.00	173	57.66
TLE 12-AFA-Ship’s Catering Services	87	100.00	38	43.68
TLE 9-10-AFA-Fish Wharf Operation	39	100.00	21	53.85
TLE 9-10-AFA-Slaughtering Operations	62	100.00	36	58.06
TVL 10-12-AFA-Fish Capture	402	100.00	33	08.21
Health Education 7	33	100.00	0	00.00
Health Education 8	35	100.00	6	17.14
Health Education 9	54	100.00	5	09.26

Subjects	Total number of topics in the CGs		FS topics in the CGs	
	<i>f</i>	%	<i>f</i>	%
Health Education 10	43	100.00	6	13.95
Science 7	76	100.00	10	13.16
Science 8	44	100.00	2	04.55
Science 9	38	100.00	1	02.63
Science 10	24	100.00	0	00.00
Total	2426	100.00	490	20.20

Legend:

EPP	<i>Edukasyong Pantahanan at Pangkabuhayan</i> [Home Economics and Livelihood Education]
TLE	Technology and Livelihood Education
TVL	Technical-Vocational Livelihood
HE	Home Economics
AFA	Agriculture and Fishery Arts
CGs	Curriculum Guides
Scie	Science
HEd	Health Education