TOWARDS DEVELOPING A SUSTAINABLE FOOD SYSTEMS EDUCATION CURRICULUM IN ELEMENTARY EDUCATION

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Abstract

This paper focuses on how to develop s sustainable food system education curriculum in Elementary school in Philippines. Lack of food sovereignty has been one of the Philippines' perennial problems. Due to inadequacy of food supply, the needs or demands of the people could not be met, and the problem leads to the poverty of the nation and the malnutrition of its people. So the purpose of this research is to find out the opportunities and suggest ways to develop sustainable food system education curriculum in elementary education. Method of research uses Participatory Action Research (PAR) is an approach to research in communities that emphasizes participation and action. It seeks to understand the world by trying to change it, collaboratively and following reflection. Findings are among other the curriculum for Sustainable Food System can be observed with the disciplinal subjects of Agriculture and Home Economics in the elementary level. The learning competencies provide the learners basic know how and strong connection of sustainable food system. While the weaknesses: availability of school backyard for gardening sites. Most of the central schools don't have available gardening sites for hands-on experience of the learners.

Keyword:
Sustainable food system, eco-literacy, elementary school curriculum

I. Introduction

Lack of food sovereignty has been one of the Philippines' perennial problems. Due to inadequacy of food supply, the needs or demands of the people could not be met, and the problem leads to the poverty of the nation and the malnutrition of its people.

The earth's overall environment has deteriorated, and ecosystems are stretched almost beyond human repair. The environment is changing at an unprecedented rate, and results allow for little adjustments for the nonliving and living things on it. One cause of this is the corporate-capitalist-driven development fueling an ever-accelerating chain of events that are spiraling out of control. Since humans are trying desperately to be technological in all areas of life and get more income in terms of monetary values, it is now common to use genetically modified organisms (GMOs) and to cheat nature with the use of chemical applications. Oftentimes, we tend to believe that this is the only way possible to achieve true development and to solve human problems such as lack of food supply, which implies a nation's true face of poverty.

Schools assume a major role in the education of next generation's citizens and decision-makers. Giving students a chance to find out about the issues that influence sustenance and to play a dynamic part in their own particular nourishment sets them up for a lifetime of considering both health and sustainability when settling on decisions about the nourishment they eat.

The purpose of this research is to find out the opportunities and suggest ways to develop sustainable food system education curriculum in elementary education and specifically attempts to answer:

- What are the learners' needs and expectations of the community in developing sustainable food systems education curriculum?
- How are the components of sustainable food systems education curriculum be framed in terms of formulation of learning objectives; selection and organization of learning contents; selection and organization of learning experiences; and, modes of academic perspectives and practical contexts evaluation?
- What are the strengths, weaknesses, opportunities, and treats of the current food systems education curriculum?

This study has been designed to investigate the internal and external factors affecting implementation of Home Economics and Livelihood Education (HELE) as this is the subject in the elementary curriculum that has the direct link with food systems education. Where there

is a consistency between the current curricular implementation and sustainable intensification is another question to be explored in the present study. The need for this study emerged as an attempt to enhance the curriculum and connect "how a plant goes from a seed to plates" (Rahm, 2002); to expose young gardeners to sustainable food systems as children eat their own produce, compost canteen food waste, and connect with adult growers and market gardeners

II. Literature Review

Concept of Sustainable Development

Brundtland Commission as they define "Sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p 43). Sustainable development is generally thought to have three components: environment, society, and economy. The well-being of these three areas is intertwined, not separate. For example, a healthy, prosperous society relies on a healthy environment to provide food and resources, safe drinking water, and clean air for its citizens.

The *Rio Declaration on Environment and Development* fleshes out the definition by listing 18 principles of sustainability (related concepts to the study where just presented):

People are entitled to a healthy and productive life in harmony with nature. Development today must not undermine the development and environment needs of present and future generations. Nations have the sovereign right to exploit their own resources, but without causing environmental damage beyond their borders. Nations shall develop international laws to provide compensation for damage that activities under their control cause to areas beyond their borders. Nations shall use the precautionary approach to protect the environment. Where there are threats of serious or irreversible damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation.

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process, and cannot be considered in isolation from it. Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to achieve sustainable development and meet the needs of the majority of people. Nations shall cooperate to conserve, protect and restore the health and integrity of the Earth's ecosystem. Nations should reduce and eliminate unsustainable patterns of production and consumption, and promote appropriate demographic policies. Environmental issues are best handled with the participation of all concerned citizens. Nations shall facilitate and encourage public awareness and participation by making environmental information widely available. Nations shall enact effective environmental laws, and develop national law regarding liability for the victims of pollution and other environmental damage. Where they have authority, nations shall assess the environmental impact of proposed activities that are likely to have a significant adverse impact. Nations should cooperate to promote an open international economic system that will lead to economic growth and sustainable development in all countries.

Environmental policies should not be used as an unjustifiable means of restricting international trade. The polluter should, in principle, bear the cost of pollution. Nations shall warn one another of natural disasters or activities that may have harmful trans-boundary impacts. Sustainable development requires better scientific understanding of the problems. Nations should share knowledge and innovative technologies to achieve the goal of sustainability. The full participation of women is essential to achieve sustainable development. The creativity, ideals and courage of youth and the knowledge of indigenous people are needed too. Nations should recognize and support the identity, culture and interests of indigenous people.

These principles serve as the guidepost and direction on how, when, what, who, and why we need to engage in sustainable development. Education is an essential tool for achieving sustainability. People around the world recognize that current economic development trends are not sustainable and that public awareness, education, and training are key to moving society toward sustainability.

On Agricultural Sustainability

Sustainable Agricultural Intensification (SAI) offers workable options to eradicate poverty and hunger while improving the environmental performance of agriculture, but requires transformative, simultaneous interventions along the whole food chain, from production to

consumption. It also requires unprecedented, large-scale behavior change by consumers as well as producers of food. Major elements of a sustainable development path for agriculture and food systems are: Shifting towards healthier diets; Ensuring the supply of safe, nutritious food to all through increasing agricultural productivity on existing crop and pasture land and making it more resilient to climatic extremes; Preserving the environment increase resource efficiency, natural resources; Reducing food losses and waste.

New visions and business models for smallholder agriculture and rural development that create economic and job opportunities and make rural areas more attractive places to live; Empowering women along the value chain; Coherent policies at all levels that stimulate behavior change, align all actors, provide secure rights to land and other resources, and incentivize solutions for sustainable intensification of agriculture and food systems that take advantage of rapid advances in science and technology. Clear goals, targets and indicators that address critical areas of food production and consumption, motivate people and provide a structured approach to guide countries in designing their own development paths for agriculture.

Monitoring agriculture and food systems at unprecedented level of detail; Long-term vision and investments in capacity building and research. Long-lasting solutions will require re-thinking of rural development and smallholder agriculture towards structural transformations that include and benefit the poor. Improved farming systems and new technologies and business models can create decent jobs, allow the overcoming of resource constraints, enable greater market participation, and also lessen physical hardships in agriculture, particularly for women and youth. Agriculture in industrialized countries will also need to change, including changes in policies that affect many low- and medium-income countries. High-income countries will have to embark on a pathway that addresses urgent issues such as unhealthy diets, food waste, the right balance of food vs. biofuels production, and fair agricultural policies. These countries will also have to lead in demonstrating how higher standards of productivity, resource efficiency, food safety and traceability, and environmental impact can be met. This can also provide important lessons for developing countries in terms of technologies and policies to consider (www.unsdsn.org).

Concerning Ecoliteracy

Aside from concentrating on the Sustainable Agriculture to achieve food systems education, another perspective is being offered to everyone to answer the change in behaviors of the youth generation about the importance of environmental sustainability. Ecoliteracy is founded on a new integration of emotional, social, and ecological intelligence—forms of intelligence popularized by Daniel Goleman. While social and emotional intelligence extend students' abilities to see from another's perspective, empathize, and show concern, ecological intelligence applies these capacities to an understanding of natural systems and melds cognitive skills with empathy for all of life. By weaving these forms of intelligence together, ecoliteracy builds on the successes—from reduced behavioral problems to increased academic achievement—of the movement in education to foster social and emotional learning. And it cultivates the knowledge, empathy, and action required for practicing sustainable living.

At a basic level, all organisms—including humans—need food, water, space, and conditions that support dynamic equilibrium to survive. By recognizing the common needs we share with all organisms, we can begin to shift our perspective from a view of humans as separate and superior to a more authentic view of humans as members of the natural world. From that perspective, we can expand our circles of empathy to consider the quality of life of other life forms, feel genuine concern about their well-being, and act on that concern.

Most young children exhibit care and compassion toward other living beings.

This is one of several indicators that human brains are wired to feel empathy and concern for other living things. Teachers can nurture this capacity to care by creating class lessons that emphasize the important roles that plants and animals play in sustaining the web of life. Empathy also can be developed through direct contact with other living things, such as by keeping live plants and animals in the classroom; taking field trips to nature areas, zoos, botanical gardens, and animal rescue centers; and involving students in field projects such as habitat restoration.

By learning about the wondrous ways that plants, animals, and other living things are interdependent, students are inspired to consider the role of interconnectedness within their communities and see the value in strengthening

those relationships by thinking and acting cooperatively.

The notion of sustainability as a community practice, however, embodies some characteristics that fall outside most schools' definitions of themselves as a "com- munity," yet these elements are essential to building ecoliteracy. For example, by examining how their community provisions itself—from school food to energy use—students can contemplate whether their everyday practices value the common good.

Historically—and for some cultures still in existence today—the path between

a decision and its consequences was short and visible. If a homesteading family cleared their land of trees, for example, they might soon experience flooding, soil erosion, a lack of shade, and a huge decrease in biodiversity.

But the global economy has created blinders that shield many of us from experiencing the far-reaching implications of our actions. As we have increased our use of fossil fuels, for instance, it has been difficult (and remains difficult for many people) to believe that we are disrupting something on the magnitude of the Earth's climate. Although some places on the planet are beginning to see evidence of climate change, most of us experience no changes. We may notice unusual weather, but daily weather is not the same as climate disruption over time.

If we strive to develop ways of living that are more life-affirming, we must find ways to make visible the things that seem invisible.

Many of the environmental crises that we face today are the unintended consequences of human behavior. For example, we have experienced many unintended but grave consequences of developing the technological ability to access, produce, and use fossil fuels. These new technological capacities have been largely viewed as progress for our society. Only recently has the public become aware of the downsides of our dependency on fossil fuels, such as pollution, suburban sprawl, international conflicts, and climate change.

Teachers can teach students a couple of noteworthy strategies for anticipating unintended consequences. One strategy—the precautionary principle—can be boiled down to this basic message: When an activity threatens to have a damaging impact on the environment or human health, precautionary actions should be taken regardless of whether a cause-and-effect relationship has been scientifically confirmed. Historically, to impose restrictions on new products, technologies, or practices, the people concerned about possible negative impacts were expected to prove scientifically that harm would result from them. By contrast, the precautionary principle (which is now in effect in many countries and in some places in the United States) places the burden of proof on the producers to demonstrate harmlessness and accept responsibility should harm occur.

No matter how adept we are at applying the precautionary principle and systems thinking, we will still encounter unanticipated consequences of our actions. Building resiliency—for example, by moving away from mono-crop agriculture or by creating local, less centralized food systems or energy networks—is another important strategy for survival in these circumstances.

We can turn to nature and find that the capacity of natural communities to rebound from unintended consequences is vital to survival.

Ecoliterate people have learned from nature that all living organisms are members of a complex, interconnected web of life and that those members inhabiting a particular place depend upon their interconnectedness for survival. Teachers can foster an understanding of the diverse web of relationships within a location by having students study that location as a system.

Ecoliterate people tend to be more aware that systems exist on various levels of scale. In nature, organisms are members of systems nested within other systems, from the micro-level to the macro-level. Each level supports the others to sustain life. When students begin to understand the intricate interplay of relationships that sustain an ecosystem, they can better appreciate the implications for survival that even a small disturbance may have, or the importance of strengthening relationships that help a system respond to disturbances.

Ecoliterate people collectively practice a way of life that fulfills the needs of the present generation while simultaneously supporting nature's inherent ability to sustain life into the future. They have learned from nature that members of a healthy ecosystem do not abuse the resources they need in order to survive. They have also learned from nature to take only what they need and to adjust their behavior in times of boom or bust. This requires that students learn to take a long view when making decisions about how to live.

III. Methodology

Participatory Action Research (PAR) is an approach to research in communities that emphasizes participation and action. It seeks to understand the world by trying to change it, collaboratively and following reflection. Practitioners make a concerted effort to integrate three basic aspect of their work: participation (life in society and democracy), action (engagement with experience and history) and research (soundness in thought and the growth of knowledge) (Chevalier & Buckles, 2013). Action unites, organically, with research" and collective processes of self-investigation (Rahman, 2008).

IV. Results and Discussion

In the Philippine Case when dealing on food system education curriculum, under the K to 12 in basic education, the Department of Education (DepEd) in the Philippines creates children's awareness about production of more food on the table, through vegetable gardening within the scope of Home Economics and Livelihood Education (HELE) subjects in the elementary and the Technology and Livelihood Education (TLE) subjects in the high school, in order to nurture resiliency and sustainability of scarce resources in localized and contextualized ways. Sustainable development becomes a policy of the Ramos administration in order to strengthen the national economy for global competitiveness; support for small-scale enterprises and local community enterprises (Agoncillo & Mangahas, 2010 as cited by Inocian & Nuneza, 2015). This awareness on sustainable development increases the need for children's protein requirement to eat vegetables in order to be healthy, without buying them in the market; but relying on the bounty of their own school vegetable gardens.

Edukasyong Pantahanan at Pangkabuhayan (EPP) is the term used for elementary level and Technology and Livelihood Education (TLE) is used for secondary level. Both terms are applied with the same goals and concepts, only that in elementary level serves as the introductory part and in the secondary level comes the area of specialization for learners.

Technology and Livelihood Education encompasses the field of Home Economics (H.E.); Industrial Arts (IA); Agri-Fishery Arts (AFA); and Information, Communication and Technology (ICT). The 24 TLE courses can be categorized under any of these fields. TLE as a course has two streams—the TR-based TLE and the Entrepreneur-based TLE—and every school has a choice as to which stream to offer, with consideration for faculty, facilities, and resources. Both streams are based on the Training Regulations, but the Entrepreneur-based TLE embeds entrepreneurship concepts in the teaching of the various subjects in HE, IA, AFA, and ICT.

TLE is geared toward the development of technological proficiency and is anchored on knowledge and information, entrepreneurial concepts, process and delivery, work values, and life skills. This means that the TLE that works is one, which is built on adequate mastery of knowledge and information, skills and processes, and the acquisition of right work values and life skills. The TLE that is functional is onewhich equips students with skills for lifelong learning. TLE that is concerned only with mere definition of terms is meaningless and shallow. TLE that is focused on mastery of skills and processes without right work values is anemic and dangerous. An effective TLE is one that is founded on the cognitive, behavioral, or psychomotor and affective dimensions of human development. Therefore teaching TLE means teaching facts, concepts, skills, and values in their entirety.

Entrepreneurial concepts form part of the foundation of quality TLE. It is expected that TLE students, after using the Learning Modules on Entrepreneurship-based TLE, imbibe the entrepreneurial spirit and consequently set up their own businesses in the areas of Agri-Fishery Arts, Industrial Arts, Home Economics, and Information and Communication Technology.

TLE by its nature is dominantly a skill subject; hence the teacher must engage students in an experiential, contextualized, and authentic teaching-learning process. It is a subject in which students learn best by doing. It is integrative in approach. For instance, it integrates entrepreneurship with all the areas of TLE. It integrates concepts, skills, and values.

Learning Area Standard

The learner demonstrates the knowledge, skills, values, and attitudes (KSVA) in Technology and Livelihood Education (TLE), which will enable him/her to gain employment, become an entrepreneur, a middle-level manpower and/or pursue higher education.

KEY STAGE STANDARDS (Grades 4-6)

The learner demonstrates an understanding of the basic knowledge and skills in entrepreneurship & ICT, Agriculture, Home Economics, and Industrial Arts toward the improvement of personal life, family, and community.

Table 1. Grade Level Standard and Daily Time Allotments

Grade Level	Level Standards	Time Allotment (Daily)
4	The learner demonstrates basic knowledge, skills, and values in agriculture, entrepreneurship and ICT, home economics, and industrial arts that can help improve self and family life.	50 minutes
5	The learner demonstrates increased knowledge, skills, and values in entrepreneurship and ICT, agriculture, home economics, and industrial arts toward improving family life and the community.	50 minutes
6	The learner demonstrates enhanced and expanded knowledge in entrepreneurship & ICT, agriculture, home economics, and industrial arts toward the improvement of the family's economic life and the community	50 minutes

Table 2. Learning Competencies (Agriculture)

Grade 4	Grade 5	Grade 6
Planting Ornamental Plants	Planting Vegetables	Planting Trees and Fruit Trees
1. Planting Ornamental Plants 1.1 Applies knowledge and skills in planting ornamental plants as a profitable activity	1. Planting Vegetables 1.1 Discusses the benefits of establishing vegetable planting for personal, family, and community consumption	1. Propagating trees and fruit trees 1.1 Discusses the importance of planting and propagating trees and fruit-bearing trees and marketing seedlings. 1.1.1 Explains benefits derived from planting trees and fruits-bearing trees to families and communities. 1.1.2 Identifies successful orchard growers in the community or adjacent communities.
1.2 Discusses the benefits of planting ornamental plants for family and community	1.2 Makes a survey to identify the vegetable plants that can be propagated according to: 1.2.1 Location, climate, wants and needs of customers	1.2 Uses technology in the conduct of survey to find out the following: 1.2.1 Elements to be observed in planting trees and fruit-bearing trees. 1.2.2 Market demands for fruits 1.2.3 Sources of fruit-bearing trees 1.2.4 Famous orchard farms in the community
1.3 Uses the technology/ internet in conducting surveys and other research and innovative methods of raising ornamental plants	1.3 Demonstrate the techniques for propagating vegetables in: 1.3.1 Plant selection 1.3.2 Make plan for garden plot 1.3.3 Prepare the plot/s in a way of bio-intensive gardening	1.3 Conduct a survey to identify: 1.3.1 Types of orchard farms 1.3.2 Trees appropriate for orchard gardening based on location, climate and marketing demands 1.3.3 Proper way of planting/

Grade 4	Grade 5	Grade 6
Planting Ornamental Plants	Planting Vegetables	Planting Trees and Fruit Trees
		propagating trees and fruit-bearing trees (budding, marcotting, grafting) 1.3.4 Sources of fruit-bearing trees 1.3.5 How to care for seedlings
1.4 Conduct survey to identify: 1.4.1 Appropriate ornamental plants according to the aesthetic value for home, wants and needs of purchasers, time, location, climate and marketing demands 1.4.2 Changes in trend to growing ornamental plants (e.g. intercropping of ornamental plants, etc.) 1.4.3 Design and plan ornamental and other suitable plants for propagation 1.4.4 Source of plants and other needs of ornamental plants 1.4.5 Method of planting and growing ornamental plants	1.4 Produces organic fertilizer 1.4.1 Discusses the importance and methods of producing organic fertilizer 1.4.2 Follows procedures and preventive precautions in the manufacture of organic fertilizer	1.4 Prepares layout design of an orchard garden using the information gathered
1.5 Prepares layout design of ornamental plants with the help of basic sketching and technology	1.5 Applies the systematic protection of vegetable planting 1.5.1 Sprinkling/watering 1.5.2 Plowing 1.5.3 Applying organic fertilizer	1.5 Propagates trees and fruit-bearing trees using scientific processes: 1.5.1 identifies the appropriate tools and equipment in plant propagation 1.5.2 Demonstrate scientific ways of propagating fruit-bearing tress 1.5.3 Observes healthy and safety measures in propagating fruit-bearing trees
1.6 Demonstrates the proper technique for growing/ cultivating ornamental plants through; 1.6.1 Selection of variety to be planted 1.6.2 Making/preparing orchard 1.6.3 Preparation for planting and germinating 1.6.4 Planting according to proper procedure	1.6 Accomplishes systematic insects and pest control in plants 1.6.1 Intercropping 1.6.2 Produce organic pests and insects control	1.6 Performs systematic and scientific ways of caring orchard trees/seedling such as watering, cultivating, preparing, and applying organic fertilizer 1.6.1 Use different ways of preparing organic fertilizer and pesticides through Internet/library 1.6.2 Explains the benefits of using fertilizer and locally

Grade 4	Grade 5	Grade 6
Planting Ornamental Plants	Planting Vegetables	Planting Trees and Fruit Trees
		made pesticides toward sustainable development 1.6.3 Observes healthy and safety measures in formulating fertilizer and organic pesticides 1.6.4 Keeps record of growth/ progress of seedlings
1.7 Explain some forms of plant breeding such as implantation in can, layering and marcotting	1.7 Demonstrates the systematic harvesting of crops 1.7.1 Discusses observable features of plants ready to be harvested 1.7.2 Demonstrates the proper ways to harvest	1.7 Markets fruits and seedlings 1.7.1 Applies scientific knowledge and skills in identifying fruits and seedlings ready for sale 1.7.2 Keeps updated record of trees/ seedlings for sale 1.7.3 Plans marketing strategy to be used in selling 1.7.4 Uses online marketing of orchard trees/ seedlings 1.7.5 Prepares flyers or brochures
1.8 Applies the systematic protection of plants in; 1.8.1 Watering, tillage, fertilizer application, and make organic fertilizer	1.8 Uses records in conducting proper timing of harvesting vegetables for sale	1.8 Develops plan for expansion of planting trees and seedling production
1.9 Show creativity and resourcefulness with the use of materials, time, and money in raising ornamental plants	1.9 Prepares a marketing plan for harvest 1.9.1 Packaging 1.9.2 Price Control 1.9.3 Fixing merchandise 1.9.4 Ways of marketing 1.9.5 Attracting buyers 1.9.6 Record investments, expenses, profits, and gains	
1.10 Apply proper harvesting/ marketing strategy for ornamental plants		
1.11 Accomplishes plan on selling ornamental plants in: 1.11.1 Adjustment of goods 1.11.2 Attracting prospective buyers 1.11.3 Recording the investments and expenses		
1.12 Execute well the marketing strategy for selling the grown ornamental plants		

Grade 4	Grade 5	Grade 6
Planting Ornamental Plants	Planting Vegetables	Planting Trees and Fruit Trees
1.13 Examine investment, expenses, profits and gains		
1.14 Commits a plan of continued propagation of ornamental plants for sale		

The elementary curriculum concerning Agriculture tends to teach the school children the production side of securing Food System while the Home Economics guides the learners how to consume food products sensibly.

Table 3. Learning Competencies (Home Economics)

Grade 4	Grade 5	Grade 6
Preparing Nutritious Food	Cooking Nutritious Food	Food Preservation
1.14. Help in the preparation of nutritious food. 1.14.1. Group meals according to Go, Grow, and Glow foods 1.14.2. Examine the nutritious substances in breakfast foods using the "food pyramid guide" and the food group 1.14.3. Make a meal plan 1.14.4. Cook and prepare foods	1.9.2. Practice habit of eating healthy foods, avoid disesases, and refrain from unhealthy activities	1.3. Allocates budget for basic and social need such as: 1.3.1 Food and clothing 1.3.2 Shelter and education 1.3.3 Social needs: social and moral obligations (birthdays, baptisms, etc.), family activities, school affairs 1.3.4 Savings/emergency budget (health, house repair
1.15. Serve cooked food pleasantly	1.24. Apply planning and cooking healthy meals (breakfast, lunch, and dinner) according to the family budget	1.4 Prepares feasible and practical budget 1.4.1 Manages family resources efficiently 1.4.2 Prioritizes needs over wants
1.16. Observe proper table manners with the use of cutlery 1.16.1. Follow table manner appropriate to cultural practices	1.25. Identify factors in planning family food budget, number of members, age, etc.	3.1 Explains different ways of food preservation (drying, salting, freezing, and processing) 3.1.1 Conducts an inventory of foods that can be preserved/ processed using any of the processes on food preservation 3.1.2 Discusses the processes in each of the food preservation/ processing method 3.1.3 Explains the benefits derived from food preservation/ processing

Grade 4	Grade 5	Grade 6
Preparing Nutritious Food	Cooking Nutritious Food	Food Preservation
1.17. Work systematically in the cleaning and washing the dishes	1.26. Make a menu for one day based on "food Pyramid and food groups	3.2 uses the tools/utensils and equipment and their substitutes in food preservation/ processing 3.2.1 Identifies the tools/ utensils and equipment 3.2.2 Prepares plan on preserving/processing food 3.3 Preserves food applying principles and skills in food preservation processing
	1.27. Record the ingredients used for cooking according to the selected recipe	3.3.1 selects food to be preserved/ processed based on availability of raw materials, market demands, and trends in the community 3.3.2 observes safety rules in food preservation / processing 3.4 conducts simple research to determine market trends and demands in preserved/ processed foods 3.5 assesses preserved/processed food as to the quality using the rubrics
	1.28. Be in charge of buying the ingredient for cooking 1.28.1. demonstrate skills in selecting quality, fresh, affordable and nutritious ingredients 1.28.2. Be contentious and aware of the ingredients that can be found in the environment 1.28.3. Be conscientious and aware of the ingredients that can be found in the environment 1.28.4. Computes accurately when doing marketing.	3.6. Markets preserved/ processed food in varied/ creative ways with pride 3.6.1. Packages product for sale creatively /artistically, prepares creative package and uses materials sourced locally, packages products artistically, and labels packaged product 3.6.2. Computes costs, sales, and gains with pride 3.6.3. Uses technology in advertising products 3.6.4. Keeps record of production and sales

Grade 4	Grade 5	Grade 6
Preparing Nutritious Food	Cooking Nutritious Food	Food Preservation
	1.29. Demonstrate skills in cooking 1.29.1. Be able to prepare the ingredients for cooking 1.29.2. Be able to follow directions for health and safety in preparing and cooking foods. 1.29.3. Be conscious not to use artificial food additives in cooking	
	1.30. Be able to perform and prepare quality food presentation 1.30.1. Be able to create and perform one's own procedure in making attractive food preparation 1.30.2. Explain the principles in table setting	

In the comparative analysis of the Philippine Case to Johns Hopkins Center for a Livable Future, these essential questions provide great impact in the sustainable food systems education curriculum: 1) How are crops grown? 2) Who harvests, processes, serves, and sells our foods? 3) How is agriculture connected to climate change? 4) How are some people making their farm more sustainable? 5) Why is food transported over long distance? 6) Where is our food supply at risk of contamination? 7) Why and how are foods processed? 8) How can we integrate the information on food packages? 9) How much food do we waste and why does it matter? 10) How do hunger and food insecurity affect people? 11) What is the role of government in the food system?

V. Conclusions

Based on interview, researcher's observation, document readings, the following are drawn: On strengths, The curriculum for Sustainable Food System can be observed with the disciplinal subjects of Agriculture and Home Economics under Edukasyon sa Pantahanan at Pangkabuhayan (EPP)in the elementary level. The learning competencies provide the learners basic know how and strong connection of sustainable food system. Legal Bases and Agricultural policies in the Macro and Micro level give direction for sustenance. Curriculum tends to be more work-oriented. Learning domains: Cognitive, Affective, and Psychomotor Skills are integral part of TLE / EPP Curriculum. Values Integration features empathy, work ethics, love for manual labor, care for environment, and sustainability. There is awareness of the situation for need of sustainable intensification. Strengthening communications pathways for disseminating technologies .

On weaknesses: availability of school backyard for gardening sites. Most of the central schools don't have available gardening sites for hands-on experience of the learners. Some Barrio schools may have available gardening sites but not big enough to accommodate all pupils to have one pupil, one garden plot ratio. Climate change and other calamities give downside effect to different crops production. Most of the assigned teachers to teach Agriculture and Home Economics

don't have line of specialization in two subjects since most of them are graduates of Bachelor in Elementary Education who are considered as Generalists. Teachers' teaching strategies include lecture against experiential learning and output based against paper pencil test for evaluation. Time on task, Engagement Time: 50-minute time allotment cannot cover needed competencies to be mastered.

Opportunities cited are: Teachers' retooling and capacity building through In-service Training. Purging partnership and sponsorship for training in Bio-Intensive Gardening as sponsored by IRR. Forming partnership for private individuals to allow school to use portion of land for gardening sites for practicum. Training for Urban gardening, Vertical gardening, Permaculture, hydroponics etc. Promotion of Ecoliteracy, Ecopedagogy, Food Justice, Critical Pedagogy. Availability of resources includes human and physical. Availability of scientists to provide weather information services is needed.

Identified treats include: Low motivation for young generation to participate and involve in the production of food; Few human resources (Aging skilled human resources); Poverty and Hunger; Food Injustices; Disruption of Supply and demands due to imbalance in the labor force between white collar jobs and blue collar jobs; Decline of soil fertility; Climate Change; Climate Change Impact; Outbreak of insect pests and diseases in crops; Environmental degradation; and, Insufficient financial resource.

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