NUTRITION AND FOOD SCIENCE

TEACHING AND LEARNING SYLLABUS

Upper Secondary

Normal (Technical) Course

Implementation starting with

2022 Secondary Three Cohort

Ministry of Education
SINGAPORE

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SECTION 1:

INTRODUCTION

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INTRODUCTION

The Nutrition and Food Science Normal (Technical) [NFS N(T)] syllabus is designed to pique students' curiosity to learn about the world around them. Through the use of their five senses of smell, touch, taste, hear and see, students are encouraged to discover about their interests and develop a sense of awareness of the world around them. The body of knowledge within the discipline is constantly evolving and the subject presents an opportunity for students to be active contributors to the field. Students will learn to take action to apply knowledge and skills they acquire through the course of study.

The syllabus considers the VUCA nature of the world that our students will need to be prepared for in the future. The shifts in landscape brings about both challenges and opportunities for our students. These changes can be largely summarized as technological developments, changing social attitudes and the existential challenge of the climate change. Our students need to be ready to take advantage of technological advancement as these shifts will affect the future of work for them. This is especially so as the food science industry is a growing sector that may provide exciting new careers for our students. With changing lifestyle and attitudes towards health, diet and nutrition, it is important for students to be equipped with the knowledge and skills to discern the impact of these changes on themselves and their community. Lastly, the existential challenge of climate change is an issue that will affect our students. There is growing awareness among governments and corporates to consider the impact of policies on the environment. In 2021, Singapore announced the Singapore Green Plan 2030 to advance the national agenda on sustainable development. These plans will impact every Singaporean and students must take personal ownership to contribute to these efforts as stewards of the environment with sustainability conscious mindsets and habits.

The NFS N(T) syllabus develops problem-solving skills in our students to design solutions and make informed decisions based on sound judgement and logical reasoning. For instance, students are taught to consider meal planning factors related to nutritional needs of different age groups as well as the effect of food on health. This would contribute towards Singapore's effort to lower the prevalence of diet-related health problems such as obesity and coronary heart disease[1]. In making decisions on how much and what to purchase, students are taught to avoid food wastage and reduce carbon footprint to mitigate the impact on the environment. The action to reduce food wastage would also support Singapore's effort towards minimising food waste[2].

Through the acquisition of knowledge in diet and nutrition, food literacy and food science, students develop critical and inventive thinking. NFS N(T) students will think critically about issues on food, health and nutrition when they engage in discussions on moral and ethical issues during their study. This develops social awareness and moral reasoning in students, a skill to navigate the challenges of the future. Students apply their food science knowledge by experimenting with recipes to improve sensory and nutritional qualities. Students also apply creativity to design and create new food products to meet consumers' demand[3]. NFS N(T) students are not just passive consumers of knowledge, but also active participants in the creation of new knowledge in the development of food science. The learning experiences in the NFS N(T) curriculum will encourage students to take risks and discover more about the world around them.

[1] https://www.moh.gov.sg/content/moh_web/home/statistics/Health_Facts_Singapore.html

[2] https://www.towardszerowaste.gov.sg/zero-waste-masterplan/chapter2/sustainable-consumption/

[3] In the food manufacturing sector in 2013, there were 844 food-related establishments and these accounted for 0.7% of Singapore's Gross Domestic Contribution with a value-add of $2,828 million. Source: Economic Development Board & SPRING Singapore (2013)

Value of Nutrition and Food Science Curriculum

The study of NFS is important as it builds a strong foundation in understanding how diet and nutrition relate to our health. Students are empowered to make informed food choices and develop an awareness of the impact of their choices on their health and environment. Food sustainability in Singapore is a growing issue that is of concern to Singaporeans and students need to be aware of the problem and possible solutions. The application of food science principles in food preparation and cooking also allow students to review and refine their diet as well as create new recipes to meet different needs.

1. **Develop Food Literacy.** Food literacy extends beyond nutrition and cookery lessons to include fostering connections between food, people, health and the environment both theoretically and practically[4]. When students develop food literacy, they understand the impact of food choices on health, the environment and the economy. According to a study on Australia's Nutrition and Food Systems Education[5], subjects related to nutrition and food science can help students make healthier food choices; develop health promoting life skills; and make informed food choices that protect the environment. The practical emphasis of the NFS N(T) syllabus ensures that students are equipped, not only with knowledge on nutrition, but also skills to plan and prepare sustainable and healthier meals to meet an individuals' and/or family's needs.

2. **Promote Nutrition and Health Education.** According to Bloomberg Healthiest Country Index, Singapore was named the world's healthiest country[6] in 2015. Singapore continues to be in the top 10 position in the most recent 2019 report[7]. However, Singapore is still at risk as highlighted by Prime Minister Lee during the 2017 National Day Rally. He stressed that diabetes is a 'very serious' problem in Singapore. Data by Health Promotion Board[8] revealed that about 440,000 Singapore residents who were 18 years and above had diabetes in 2014. If not controlled, this number is estimated to grow to 1,000,000 in 2050, which may result in an overwhelming economic and social issue in the future. NFS N(T) students are empowered to make wise food choices when they learn about diabetes and other diet-related health problems.

3. **Develop Awareness in Food Sustainability.** It is necessary for Singapore to tackle various issues of food sustainability, which includes reducing food wastage[9] and maintaining food security[10]. The amount of food waste generated in Singapore has increased by around 20% over the last 10 years[11]. When food is wasted, resources that are used to grow and bring food to our table are also wasted. It is also essential to reduce food waste to reduce waste disposal and landfill space in a land-scarce Singapore. Efforts to reduce food waste are important to reduce carbon footprint, and it also contributes to efforts to tackle global warming and climate change. As a small city-state with limited resources, Singapore imports more than 90% of its food. Safeguarding food security is therefore paramount to Singapore to ensure that a regular supply of food remains safe

[4] Colatruglio, Sarah & Slater, Joyce. (2014). Food Literacy: Bridging the Gap between Food, Nutrition and Well-Being.
[5] Sadegholvad, S., Yeatman, H., Parrish, A. M., & Worsley, A. (2017). What Should Be Taught in Secondary Schools' Nutrition and Food Systems Education? Views from Prominent Food-Related Professionals in Australia. *Nutrients*, *9*(11), 1207. doi:10.3390/nu9111207
[6] https://www.weforum.org/agenda/2015/10/which-are-the-worlds-healthiest-countries/
[7] https://www.bloomberg.com/news/articles/2019-02-24/spain-tops-italy-as-world-s-healthiest-nation-while-u-s-slips
[8] https://www.healthhub.sg/a-z/diseases-and-conditions/626/diabetes
[9] https://www.towardszerowaste.sg/foodwaste/
[10] https://www.sfa.gov.sg/food-farming/sgfoodstory
[11] https://www.towardszerowaste.sg/foodwaste/

and affordable. To buffer food supply disruption, Singapore launched its 30 by 30 vision[12]. This initiative encourages local farms to increase research and development efforts to increase productivity. NFS N(T) students can become active contributors to Singapore's effort to battle against food wastage and become the driver of the 30 by 30 vision when they understand their role in supporting fresh local produce.

4. **Promote Food Innovation.** Trends such as a growing demand for healthier options, alternative protein sources and increasing demand for eco-friendly packaging are driving the food industry to be innovative in their products and solutions[13]. In 2018, a new government initiative, FoodInnovate, was launched to drive food innovation and help local firms adapt to industry disruptions[14] and to meet the increasing demands of consumers. These include the use of new ingredients and developing niche products catered to the needs of specific target groups. Several multinational foodtech companies had also set up food laboratories and research centres in Singapore in recent years[15]. The NFS N(T) syllabus prepares students for career in these companies. Students are given opportunities in their course of study to innovate and explore dishes to meet the evolving nutritional and sensory needs of the society.

5. **Promote Local Food Culture.** Singapore's hawker culture has been officially added to the Unesco Representative List of the Intangible Cultural Heritage of Humanity in 2020[16]. It is a move towards letting the rest of the world know more about our local food and multicultural heritage. Within Singapore, cross-cultural awareness can be promoted through food, a common theme amongst all groups of Singaporeans. Students are exposed to local recipes and dishes that celebrate our local food culture in the syllabus. The heightened awareness foster harmony amongst Singaporeans as we learn to respect and appreciate cultural differences.

[12] https://www.sfa.gov.sg/food-farming
[13] https://www.businesstimes.com.sg/opinion/how-singapores-food-industry-is-shaking-things-up
[14] https://www.straitstimes.com/singapore/health/new-government-strategy-will-drive-food-innovation
[15] https://www.businesstimes.com.sg/opinion/how-singapores-food-industry-is-shaking-things-up
[16] https://www.straitstimes.com/singapore/singapores-hawker-culture-added-to-unesco-list-of-intangible-cultural-heritage

Framework for 21st Century Competencies and Student Outcomes

The NFS curriculum offers opportunities for students to develop 21st Century Competencies (21CC) and Student Outcomes through:

a) **Civic, Global and Cross-cultural Literacy.** Students will have the opportunity to learnt about current needs and future trends in related fields. For instance, students learn how food choices may have an impact on the environment and the development of sustainability-conscious mindsets and habits. They may plan meals based on the nutritional needs of the target group while considering food sources that produce less carbon footprint. The selection of food from sustainable sources may drive the demand of alternative food in future.

b) **Critical, Adaptive and Inventive Thinking.** Students will have the opportunity to engage in hands-on or experiential learning and be equipped with skills to apply knowledge in authentic scenarios. These occur through coursework-based assessment where students carry out background study, make informed decisions of suitable dishes to prepare, and explore and innovate the dishes based on the task requirements.

c) **Communication, Collaboration and Information Skills.** Students will have the opportunities to collaborate with one another and communicate their thoughts during practical sessions and class discussions. The report writing component in coursework further develops their written communication skills as they present the information gathered in an organised manner.

The knowledge, skills and attitudes in the NFS syllabus support the development of 21CC and student outcomes in all domains – Civic, Global and Cross-cultural Literacy, Critical, Adaptive and Inventive Thinking, and Communication, Collaboration and Information Skills. Table 1 shows how the NFS syllabus correspond to MOE's 21CC Standards and Developmental Milestone.

Table 1. Knowledge, Skills and Attitudes in NFS N(T) and the Corresponding 21CC Developmental Milestone for Upper Secondary

Knowledge, Skill and Attitude in NFS	Corresponding 21CC Development Milestone
Civic, Global and Cross-Cultural Literacy	
▪ Consider social factors when planning meals for different ethnic and/or religious groups	1.4 The student can convey and critically evaluate knowledge to co-construct new understandings and complex ideas persuasively and with impact, while considering the specific purpose and context of communication.
▪ Work well and show respect with other socio-cultural groups during lessons and collaborative learning	6.4 The student can contribute to information and perspectives shared in constructive and ethical ways, and manage their online reputation and relationships responsibly.
Critical, Adaptive and Inventive Thinking	
▪ Understand the relationship between nutrition/diet and health and makes connections and ideas to solve issues ▪ Makes decisions, with supporting justifications, to incorporate food sustainability	1.4 The student can use evidence and adopt different viewpoints to explain their reasoning and decisions, having considered the implications of the relationship among different viewpoints. 5. The student can generate ideas that are unique or modified substantially from existing ones and explore different pathways that lead to solutions.
▪ Understand the scientific principles underlying food preparation and safety ▪ Explore, adapt and modify ideas and/or recipes to meet the task requirement ▪ Manages complexities and ambiguities by adjusting one's perspective and strategies ▪ Assesses different contexts and situations to make connections and draw new insights	2.4 The student can plan, organise and evaluate their thinking strategies to monitor their learning. They suspend judgement, reassess conclusions and consider alternatives to refine their thoughts, attitudes, behaviour and actions. 4.4. The student can draw on different perspectives and strategies to adjust their approach when required, adapting learnt knowledge and skills in new and unexpected contexts to solve complex and unexpected problems. 3.4 The student can draw on the similarities and differences between different contexts or situations to extract new insights to inform their perspective or approach.
Communication, Collaboration and Information Skills	
▪ Effectively communicates information and co-constructs meaning	1.4 The student can convey and critically evaluate knowledge to co-construct new understandings and complex ideas persuasively and with impact, while considering the specific purpose and context of communication.

▪ Employs effective strategies to locate digital and non-digital information and resources, and exercises discernment by evaluating the accuracy, credibility, and relevance of information	5.4 The student can refine search results, organise information systematically and manage information sensitively, and evaluate the accuracy, credibility and relevance of information.

Framework and Big Ideas of Nutrition and Food Science Curriculum

The design of the Nutrition and Food Science syllabus is guided by the Nutrition and Food Science Education Framework. This framework is organised according to the three student outcomes: *Health Ambassador*, *Discerning Consumer* and *Food Innovator*, which stem from the value of the subject. The middle ring shows the 3 main attitudes; **Appreciate**, **Advocate** and **Apply**, in which the curriculum should be anchored upon. The main strands of the subject, Nutrition & Health, Food Literacy[17] & Consumer Literacy and Food Science were included in the framework to guide the overarching content.

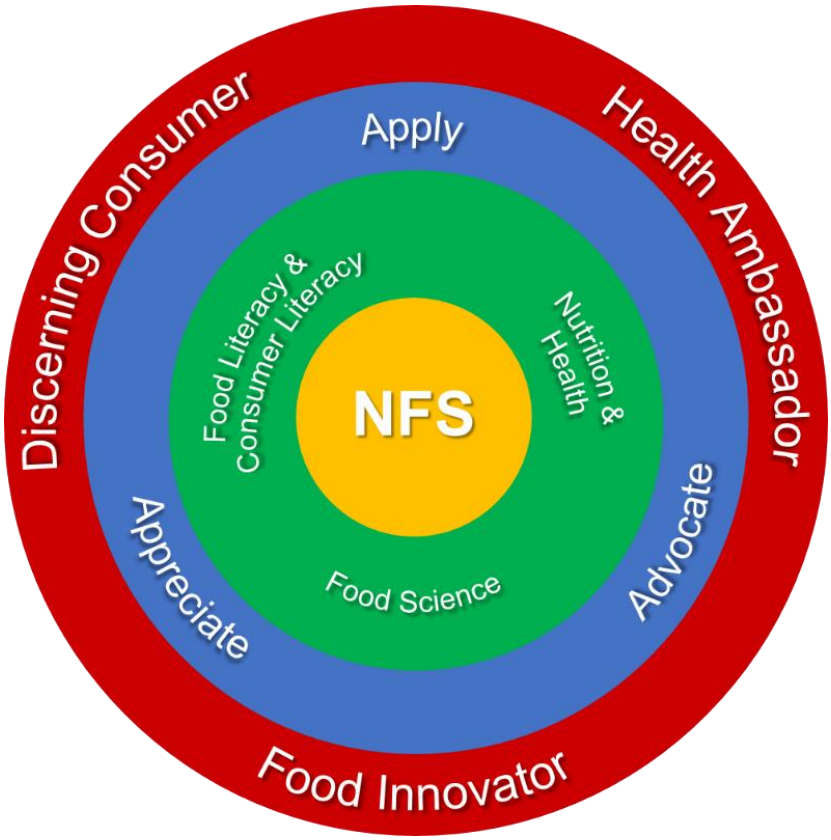


Figure 1: Nutrition and Food Science Education Framework

The focus of each strand is elaborated below:

a) **<u>Nutrition and Health</u>.** The topics like Nutrients and Diet & Health provide the foundation for students to understand the importance of good nutrition that will lead to proper growth and physical development of a person. It provides the basis for selecting and preparing food for consumption. When students understand the needs of proper nutrition, they would be able to

[17] Lai-Yeung, T (2015) *Food Literacy to Integrate Declarative and Procedural Food Skills into School of Community Based Healthy Eating Programs*, Dept of Health & Physical Education, HK Institute of Education

link the causes of various diet-related health problems to the diet and nutritional needs of individuals.

b) **Food Literacy and Consumer Literacy.** The topics like Food Management and Smart Consumer provide the fundamental concepts for developing a discerning person, capable of planning a balanced meal and making responsible decisions in food selection. Selecting food from sustainable source is an important aspect in the Singapore food scene as Singapore imports more than 90% of its food. Students will also be taught to reduce food wastage through proper food management and consumer decisions so that they can play an active role in ensuring food sustainability.

c) **Food Science.** The science behind basic food preparation and cooking is covered in this strand. It allows students to learn food preparation and culinary skills for the application of food science concepts. Students can use their knowledge in culinary food science to innovate food items to meet various human nutritional needs. For example, exploring the use of different cooking methods and ingredients to create a healthier version of *Nasi Lemak,* or exploring the amount of fat used in creamed cakes and how it might affect its appearance, taste and texture.

As NFS students understand the concepts learnt in the curriculum, they would be able to advocate nutrition and health for self, family and the community. They will better appreciate the importance of using a variety of food in food management and the issues of food security, including food safety and sustainable food consumption. NFS students also have the opportunities to apply scientific principles during food preparation and cooking, thereby achieving the student outcomes of a health ambassador, a discerning consumer and a food innovator.

The big ideas of the subject can be found in Table 2 as follows:

Table 2. NFS Big Ideas

Strand	Big Idea
Nutrition and Health	Right amount of nutrients is essential for proper growth and development. Excessive or deficiency in nutrient intake can lead to diet-related health problems.
Food Literacy	A balanced diet is achieved through proper meal planning. Appropriate food choices contribute to sustainable food consumption. A discerning consumer makes informed decisions for self, family and community.
Food Science	Food will deteriorate in quality if not handled or stored properly. Sensory qualities of food are altered during preparation and cooking. Application of food science principles can culminate in unlimited combination of food possibilities that can meet human nutritional needs.

Syllabus Aims

The syllabus aims to develop students to:

- lead a healthier lifestyle proactively through proper diet and nutrition;
- advocate sustainable food consumption by planning and making appropriate food choices; and
- apply principles of culinary science creatively in food preparation and cooking.

The content of NFS N(T) syllabus is aligned to the NFS O and N(A) syllabuses. However, the instructional words and scoping of Learning Outcomes (LOs) ensures that the demand of the syllabus remains accessible to N(T) students. The fundamental concepts from Food Studies were also kept, with a continued emphasis on hands-on tasks to achieve the syllabus aims of NFS N(T).

SECTION 2:

CONTENT

Overview of Content Structure
Syllabus Outline

Overview of Content Structure

The NFS syllabus content comprises three strands, Nutrition and Health, Food Literacy and Consumer Literacy and Food Science. An overview of the organisation of the syllabus content is presented in Table 3.

Table 3. Content Structure of NFS Syllabus

Strands	Topics	Remarks
Nutrition and Health	Nutrients Diet and Health	This strand is about the importance of macronutrients, micronutrients, water and dietary fibre in the diet and their relationship to health. Students will understand how diet may affect health.
Food Literacy and Consumer Literacy	Food Management Smart Consumer	This strand focuses on factors to consider when planning meals for various groups of people. Students will also learn the use of convenience food and how to interpret information found on food labels. This develops students to be discerning consumers who make right food choices.
Food Science	Food Safety The Science in Food Preparation Reactions in Food During Preparation and Cooking Sensory Evaluation of Food	This strand covers topics such as food safety, the reasons for cooking food, and the science behind food preparation and cooking. Understanding how different cooking methods work and the key procedures when preparing and cooking can foster students to be inquisitive and create new food products, while sensory evaluation of food helps students evaluate their creation.

Syllabus Outline

TOPIC	LEARNING OUTCOMES Candidates will be able to:
1. NUTRITION AND HEALTH	
A. Nutrients, Water and Dietary Fibre	**1. Proteins** (a) List the food sources of protein (b) State the functions of proteins in the body (growth of body and repair of cells) Define: (i) high biological value proteins and give food example (ii) low biological value proteins and give food examples
	2. Carbohydrates (a) List the food sources of carbohydrates (b) State the function of carbohydrates in the body (provide energy) (c) Define: (i) simple carbohydrates and give food example (ii) complex carbohydrates and give food examples
	3. Fats (a) List the food sources of fats (b) State the functions of fats in the body (rich source of energy; keep the body warm; protect internal organs) (c) Define: (i) fats and give food examples (ii) oils and give food examples (d) State the uses of fats and oils in food preparation and cooking
	4. Vitamins (a) Classify vitamins into fat-soluble vitamins (A and D) and water-soluble vitamins (B group and C) (b) List the food sources of the following vitamins: A, B group, C and D (c) State the functions of vitamins A, B-group, C and D in the body (A: for healthy skin and eyes; B group: releases energy from food; C: for strong immunity; D: helps body to absorb calcium)
	5. Minerals (a) List the food sources of the following minerals: calcium, iron, sodium chloride (b) State the functions of calcium, iron, sodium chloride in the body (calcium: forms strong bones and teeth; iron: makes red blood cells; sodium chloride: maintains fluid balance)
	6. Water (a) State the factors that affect water intake: state of health, diet, level of activity and environment (b) List the food sources of water in the diet (c) State the functions of water in the body (maintains body temperature; removes waste; transports nutrients)
	7. Dietary Fibre (a) List the food sources of dietary fibre (b) State the functions of dietary fibre in the body (increases satiety value; removes waste)

TOPIC	LEARNING OUTCOMES Candidates will be able to:
B. Diet and Health Problems	**8. Diet and Health Problems** (a) State the common health problems associated with an excessive or insufficient intake of some nutrients in Singapore: (i) obesity (ii) hypertension (iii) type 2 diabetes (iv) coronary heart disease
2. FOOD LITERACY	
A. Food Management	**9. Diet & Meal Planning** (a) Explain the term balanced diet (b) Explain the factors to consider when planning meals: (i) age (school children, teenagers, adults and elderly) (ii) gender (iii) level of physical activity (iv) religions (Buddhism, Christianity, Hinduism, Islam) (v) vegetarianism (vegetarians, vegans) (vi) budget (including considerations for sustainability e.g., buying just enough, buying ugly produce at a discounted price, buying from nearby or local at cheaper price)
	10. Meal Analysis (a) Plan and modify recipes / meals using the food guide recommended by HPB to meet different dietary / nutritional needs
B. Smart Consumer	**11. Convenience Food** (a) List the different types of convenience food (ready-to-cook and ready-to-eat: bottled / canned food, dried food, frozen / chilled food) (b) Explain the advantages and disadvantages of convenience food (c) State the types of information found on food and nutrition labels (d) Interpret and apply information found on food and nutrition labels
3. FOOD SCIENCE	
A. The Science of Food Preparation and Cooking	**12. Food Safety** (a) State how to avoid and reduce the risk of food spoilage and food contamination when preparing, cooking and storing food (including hygienic practices)
	13. Preparation and Cooking of Food (a) State the reasons for cooking food (makes food easier to chew and digest; improves appearance and flavour of food; makes food safe to eat) (b) State types and uses of the following food commodities: (i) meat (ii) poultry (iii) seafood (iv) eggs (v) dairy products (vi) cereals (vii) fruit (viii) vegetables

	(ix) pulses and legumes (c) Identify the structure of meat, eggs and cereals (d) Explain the points to note when preparing and cooking the food commodities
B. Reactions in Food during Preparation and Cooking	**14. Methods of Cooking** (a) Explain how heat is transferred (conduction, convection and radiation) in the different methods of cooking (grilling, baking, dry-frying, stir-frying / sautéing, shallow-frying, deep-frying, boiling, simmering, steaming, microwave cooking) (b) State the advantages and disadvantages of each method of cooking
	15. Reactions in Food during Preparation and Cooking (a) Demonstrate the skills required in the preparation and cooking of the following products (including local dishes): (i) cakes, biscuits (creaming, rubbing-in, whisking) (ii) shortcrust pastry (iii) batters (thin and thick) (iv) sauces (roux and blended) (b) State the reasons for the following procedures: (i) Creamed cakes: cream butter and sugar in creamed cakes to incorporate air into the mixture (ii) Rubbed-in cakes, biscuits and shortcrust pastry: use hard fat to achieve a breadcrumb consistency (iii) Whisked cakes: whisk eggs and sugar until light and fluffy to introduce air; fold in flour gently to whisked egg whites to prevent air bubbles in the mixture from being knocked out (iv) Batters: add liquid to flour gradually while stirring to prevent lumps (v) Sauces: cook on low heat with constant stirring to prevent lumps (c) State the common faults and causes of the following: (i) Cakes: cracked cake, sunken cake, sunken fruits (ii) Biscuits: flat biscuit, hard and dry biscuits (iii) Batters: soggy texture, undercooked food within the cooked batter (iv) Pastries: tough and hard pastry, shrunken pastries (v) Sauces: lumpy sauce, dried sauce
	16. Sensory Evaluation (a) State sensory properties (texture, flavour, appearance, aroma) that are used to conduct sensory evaluation of food products (b) Evaluate the sensory properties (texture, flavour, appearance, aroma) of food products

SECTION 3:

PEDAGOGY

The Singapore Curriculum Philosophy
Pedagogical Considerations
Teaching Processes
Teaching and Learning Strategies

The Singapore Curriculum Philosophy

The Singapore Curriculum Philosophy (SCP) guides teachers to think about the teaching and learning of the curriculum, while placing our students' interest at heart.

The beliefs of SCP are:

(i) We believe in holistic education.
(ii) We believe that every child wants to learn and can learn. We focus on students' learning needs when designing learning experiences.
(iii) We believe that learning flourishes:
- in caring and safe environments,
- when students construct knowledge actively,
- through the development of thinking skills and dispositions, and
- when assessment is used to address students' learning gaps.

NFS teachers should use these beliefs when designing and implementing lesson ideas to enhance the learning experiences of the students. This can help students find more meaning and make connections in the knowledge and skills gained through the curriculum.

Pedagogical Considerations

Learner-centred approach that involves students in doing and evaluating their work support the applied learning nature in the NFS N(T) syllabus. In the study of NFS N(T), it is important that students find meaning in learning the subject matter and this can be enacted with appropriate strategies to develop students' interest. Activity-based Learning (ABL) such as Inquiry-Based Learning (IBL) and Experiential Learning (ExL) are strategies that support the applied learning nature in the NFS N(T) syllabus. They are learner-centred approaches that involve students in doing, reflecting and evaluating the processes and products. These teaching and learning strategies encourage students to take ownership of their learning. Students also construct their own knowledge when they generate explanations, elaborate and/or evaluate using their theoretical and practical understanding on the outcomes they observed or experienced.

ABL encourages collaborative and active learning. For example, in an ABL lesson on meal planning, students may conduct interviews on their peers and teachers to find out the needs of different age groups. They may then form groups to discuss their findings and select/modify suitable dishes from the school canteen as part of a healthy diet. By doing so, it brings about better knowledge retention as the students learn by doing, reflect on what they observe, construct knowledge using both theoretical and practical understanding and apply their learning to solve the task. When students work together in small groups towards a common goal, it promotes interpersonal skills that are essential for the 21st century.

IBL and ExL can be incorporated in the teaching and learning of NFS N(T) when students evaluate their findings from their exploration component of the coursework to determine the appropriate ingredients, temperature, preparation time or quantity of ingredients that would produce the best outcomes for a food product. Another example could be giving students recipes with missing key ingredients and having them evaluate the end product and identify the function of the missing key ingredient.

Teaching Processes

The Singapore Teaching Practice (STP) is a model that makes explicit how effective teaching and learning can be achieved in our Singapore classrooms. One of the components of the STP, the Pedagogical Practices, comprises four Teaching Processes that outline what teachers ought to reflect on and put into practice before, during and after their interactions with students in all learning contexts.

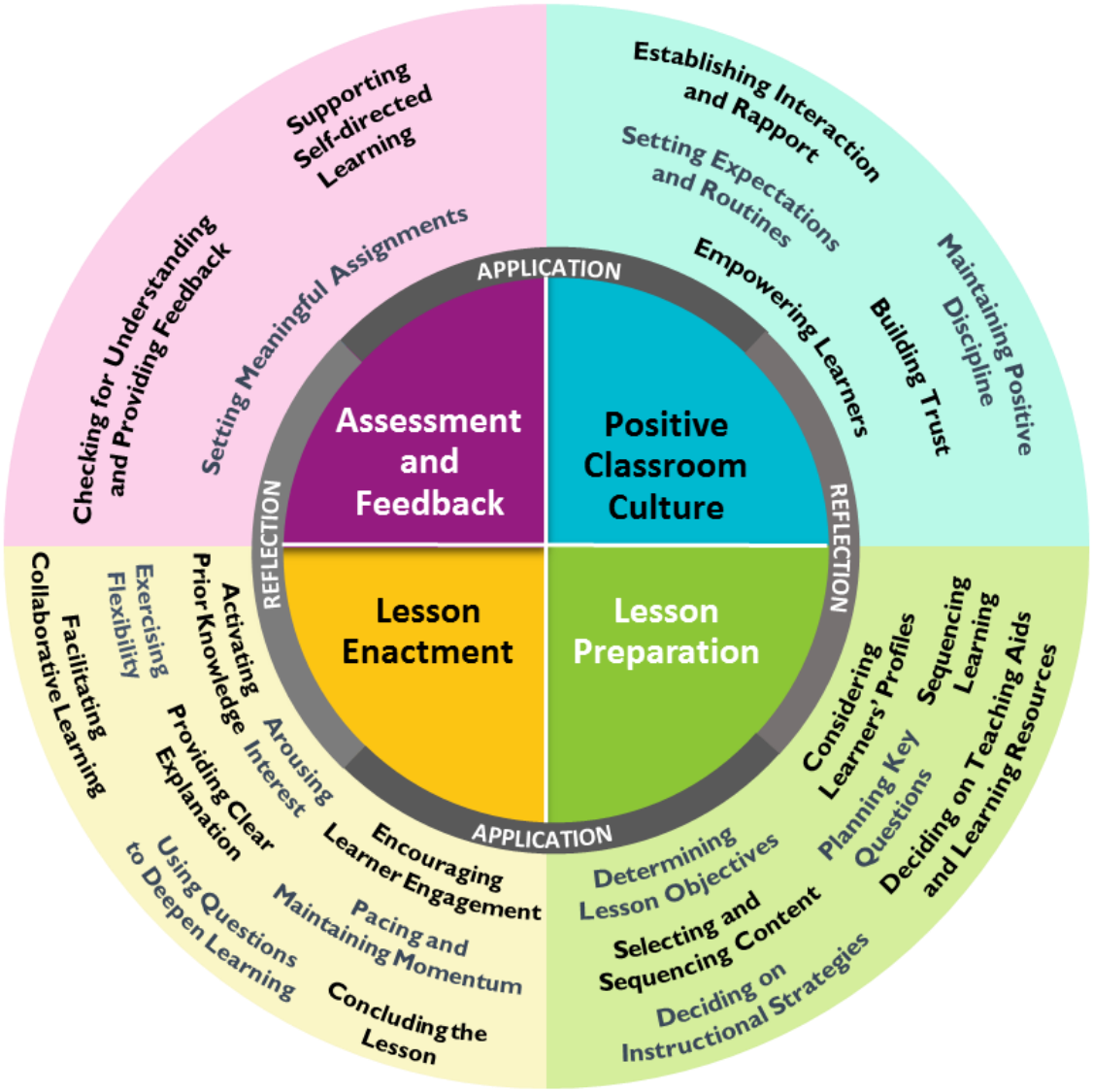


Figure 2: Diagram of the Pedagogical Practices

As we value every child as an individual with diverse learning needs, experiences, beliefs, knowledge and skills, there is a need to customise and adapt the enactment of the Teaching Areas and Teaching Actions to bring about developmentally appropriate teaching of NFS N(T). Each of the 24 Teaching Areas include a set of important considerations or Teaching Actions that helps enact it.

Teaching and Learning Strategies

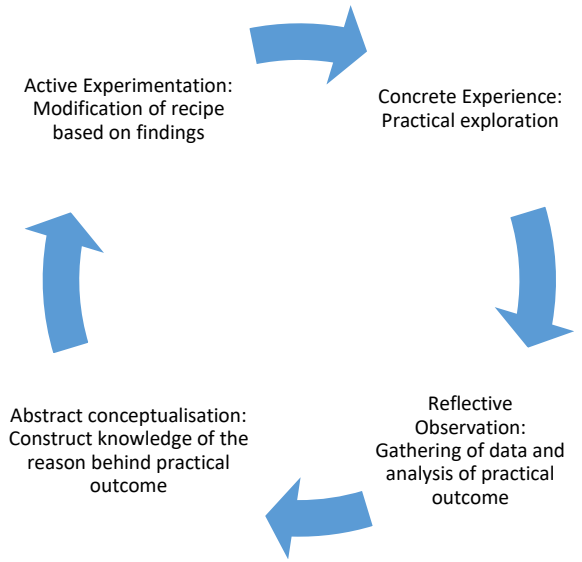
In addition to the learning activities presented in the Syllabus Outline, the following suggested lesson examples (Table 3) are pegged to the Teaching Areas of the STP that could be used in the NFS N(T) lessons.

Table 3. Teaching and Learning Strategies in NFS N(T)

Teaching Area	Teaching Action	Lesson Example
Activating prior knowledge / Facilitating collaborative learning	**Teaching Action 1: Think-Pair-Share** Based on the task, students consider a question on their own before proceeding to discuss with their peers. This way, they learn from one another and deepen their understanding and application on their learning when given such opportunities.	Prepare two egg dishes to show the different uses of eggs when cooking for a teenager. Students to take part in peer review by evaluating the suitability of the dishes for the task: • nutritional content • attractiveness of meal for teenagers • uses of eggs in the selected dishes
Arousing interest	**Teaching Action 1: Using Stories and Images** The use of stories and images can help students make connection to the theory and real-life context. This could trigger students to put in effort to explore the content and deepen their understanding of the topic(s). Real-life examples and real-world problems could be presented to students to allow them to discuss, identify the problems and provide possible solutions.	A video on over-preparation of food in Singapore can be shared with the students. Teachers can get the class to share how over-buying food can lead to food wastage and increase in budget. To further engage the students, teachers could get students to: • discuss how they can reduce their budget when planning meals.

Encouraging learner engagement	**Teaching Action 2: Explore, Engage, Apply** When students are involved in authentic tasks and able to connect what they have learnt, they will be more motivated to complete the tasks. IBL can be used in this instance to get students excited as they play a part in the discovery of their own knowledge.	An example of how an NFS N(T) lesson can be anchored using the 5E instructional model: Engagement: excite the students by bringing variations of milk (regular, low-fat and skimmed) into the classroom (use number code to label the milk samples), allow students to taste the milk and get students to indicate their preference. Exploration: split the students into groups based on their preference and get them to study the food labels of the different variations of milk and guess which food label belongs to their preferred milk. Explanation: get the students to research on the fat content in milk and explain how the fat content of the different variations of milk affects their sensory properties. Elaboration: students will further explain on the uses of milk in cooking and how milk of different fat contents are suitable for different groups of people. They should link them to topics such as diet-related health problems and uses of milk in cooking. Evaluation: get the students to prepare a poster presentation to share how to read a food label and be a discerning consumer. Students could also check their own progress through a set of post-lesson quiz. *5E model adapted from: Biological Sciences Curriculum Study (BSCS)*

Facilitating collaborative learning	**Teaching Action 3: Reciprocal Teaching** This involves two or more students teaching one another. In the process, the students monitor their own and their peers' learning and thinking.	1. Students are tasked to prepare a time plan for two recipes. 2. Exchange time plan with partner. 3. Partner will execute out each other's time plan in a practical lesson. 4. Peer review/evaluate time plan and give feedback on how to improve.
	Collaborative Learning Working together to complete a shared goal maximises students' learning. In the process of accomplishing the given goal, students search for solutions together and make sense of the information as a group. Such behaviours allow them to deepen their understanding of the concept learnt.	Task: Plan and prepare three suitable dishes for schoolchildren. <u>Instruction:</u> 1. Get students to form into groups of three. 2. Submit a plan with the following information: a) Background Study b) Decision Making (justify the choice of dishes) c) Time Plan (division of work and order of food preparation) 3. Prepare three dishes. Task: Prepare a poster/brochure with that encourages seniors to consume more calcium in their diet. Instruction: 1. Work in pairs. 2. Research and prepare the poster/brochure.

Using questions to deepen learning	**Teaching Action 2: Pumping** This encourages students to generate ideas based on reasoning and prior knowledge. It uses a series of questions to prompt and guide students' thinking in the form of feedback chain. ExL is the process of learning through experiences where students learn by reflecting on what they are doing or have done with the teacher being a facilitator. In NFS practical sessions, students conduct exploration on skills, ingredients or cooking methods. They then analyse results and record their observations based on their theoretical and practical understanding. Teachers often guide the students in the construction of their own knowledge by asking questions.	

SECTION 4:

ASSESSMENT

Formative Assessment
Summative Assessment
National Examination

Assessment is integral to the learning process and helps students become self-directed learners. As such, we design assessments with clarity of purpose, to provide learners and teachers with feedback to address learning gaps and improve teaching practices.

It is necessary that assessment is closely aligned with curricular objectives, content and pedagogy. In the assessment of NFS N(T) curriculum, both formative and summative assessment could be used during school-based assessment to check for students' understanding and provide opportunities for them to apply the knowledge and skills they had learnt.

Formative Assessment

Formative Assessment (FA) is carried out during the instructional process to provide feedback to adjust ongoing teaching and learning in order to improve students' achievement of intended instructional outcomes. It may involve informal methods such as observation and oral questioning, or the formative use of more formal measures such as quizzes, portfolios, or performance assessment.

Assessment for Learning (AfL) is an assessment that supports teaching and learning with the specific use of learner-centred approaches and strategies. Information obtained from AfL can help teachers identify gaps in students' learning and provide quality feedback for students on how to improve their work.

Summative Assessment

The purpose of summative assessment (SA) is to provide information on students' mastery of content, knowledge and skills, and assigning grades or certifying students' proficiency. In Secondary Three, there should be no more than one weighted assessment (WA) per term, in addition to end-of-year examination (EYE). There will not be mid-year examination (MYE) in Secondary Three. In Secondary Four, there should be no more than one WA per term, in addition to MYE and EYE.

In NFS N(T), WA and/or examinations could be aimed to assess students' understanding and application of the concepts learnt rather than on recall of knowledge. Table 8 shows varied item types recommended for NFS (NT) WA and/ or examinations. Other than written form of assessment, schools could also consider alternative modes of assessment in SA such as practical skills and coursework process skills.

National Examination

The examination papers are designed according to the assessment objectives. The assessment objectives are classified into three main areas:

AOA Knowledge with understanding

Candidates should be able to demonstrate knowledge and understanding of facts, concepts, and terminology in relation to:

(i) nutrition and health
(ii) food literacy and consumer literacy
(iii) food science

AOB Handling and applying information

Candidates should be able to:

- locate and select information
- interpret information
- present reasoned explanations

AOC Application of skills, knowledge and understanding in a variety of contexts

Candidates should be able to extend the learnt knowledge to carry out coursework involving the following processes:

- define, gather and process information on the coursework task
- justify selection of three appropriate dishes
- observe, record and provide explanation on the learning acquired from exploring one dish
- demonstrate good organisational and time management skills
- apply various food preparation techniques and use different cooking methods in preparing dishes/meals for different situations
- demonstrate proficient use of equipment and good management of resources in food preparation
- demonstrate the ability to evaluate the sensory outcome of the dishes

Refer to Singapore-Cambridge GCE N(T) Examination Syllabus Guide from SEAB for more information on assessment criteria of coursework.

Ministry of Education
SINGAPORE