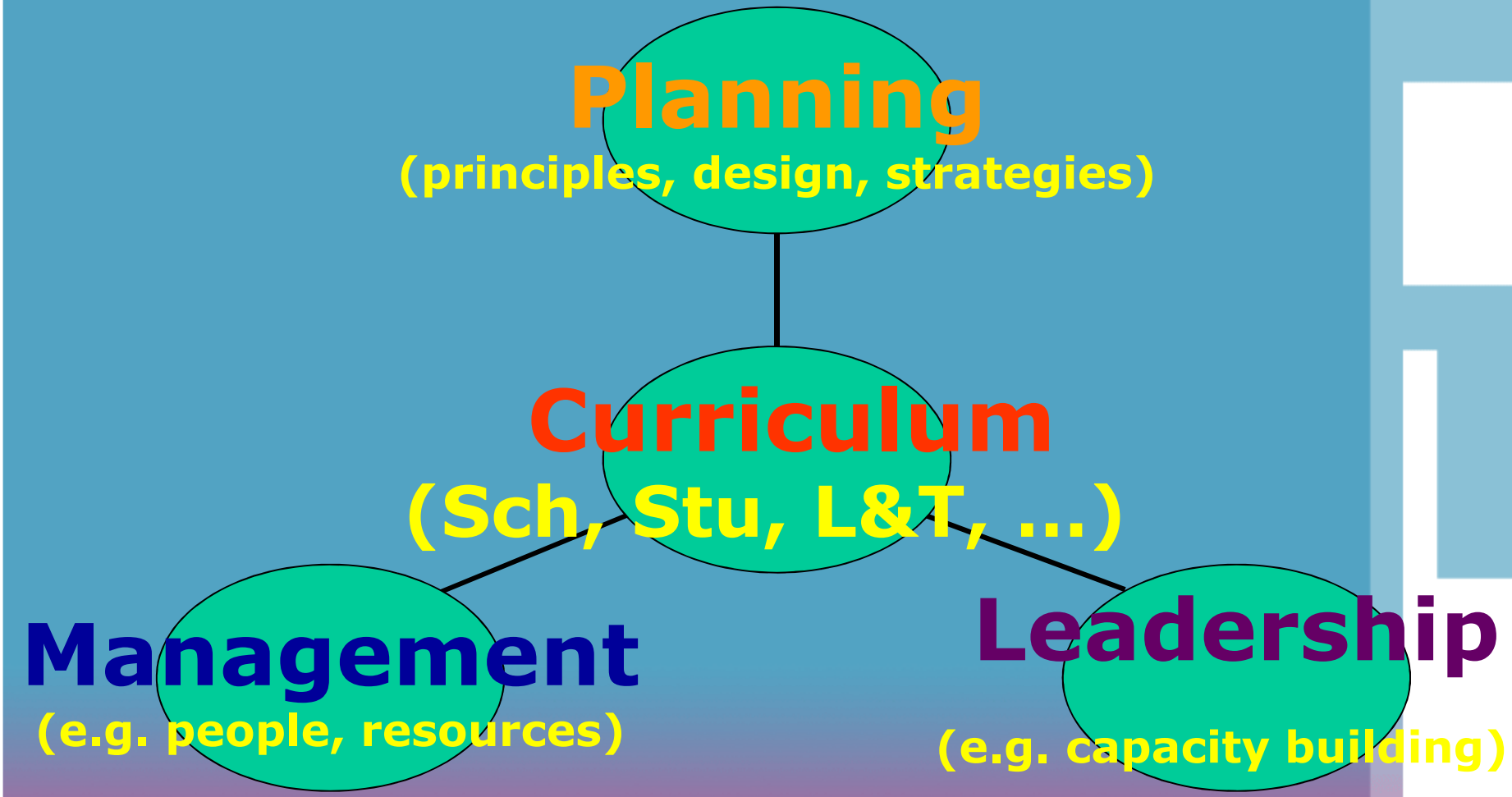
Curriculum Management, Planning and Leadership in Home Economics / Technology and Living (Refreshed)

13 May 2015

科技與生活
Technology and Living

教育統籌局
Education and Manpower Bureau

Technology and Living Curriculum



Background of school

- Located at Tseung Kwan O
- Co-educational school
- Under school-based fine-tuned MOI policy, English was the MOI in the Secondary School starting from the academic year2010-2011
- 2 members in TL department
- TL room renovated in 2011

Timetabling

Level	Duration	No of students per class	Lessons per week	Weeks per year	Minutes per lesson
S1	First semester: Girls (DT), Boys (TL) Second semester : Girls (TL), Boys (DT) *Subject selection (DT or TL) before post-exam activities*	/	2	27	35 or 40
S2	Whole year (selected students)	24-26(TL) (whole class :33-34 students)	2	27	35 or 40
S3	Whole year (same group of students from S2)	24-26	2	27	35 or 40
S4	/	13	6	35	35 or 40
S5	/	16	5	35	35 or 40
S6	/	18	5	35	35 or 40

Roles of Teachers

Roles of teachers	Actions (examples)
Transmitter 知識傳授者	Give lecture, provide information
Facilitator 促導者	Discuss with students, provide guidance in the process, engaging and supporting all students in learning
Resource person 資訊提供者	Advise on sources of information, provide an access to the world of resources outside the classroom, build networks for learning
Counsellor 輔導者	Provide advice on study methods and pathways
Assessor 評估者	Inform students of their strengths, weaknesses, and general progress and how to improve
Leader 領導者	Take the lead in motivating student learning, creating and maintaining effective environments for student learning, planning and designing learning experiences for all students, organising subject content for student learning
Co-learner 共同學習者	Learn alongside students

Strategies for Leaders

- Be Proactive
- Begin with the End in Mind
- Put First Things First
- Think Win-win
- Seek First to understand, then to be understood
- Synergize
- Sharpen the saw

Covey, Stephen The 7 Habits of Highly Effective People

Role of TL panel head as a leader

Learning and Teaching resources:

- Library books - - selection of library books
- Teaching resources - - e.g. Supplementary notes for S2 and S3 students (simplified version from NSS notes), WS, Website etc, sharing through campus intranet
- Reference books - - purchased by NSS grant and stored in TL room

Room / equipment management:

- Experiment apparatus - - from chemistry laboratory and stored in TL room
- Latest appliances - - e.g. ice-cream maker, food dryer , electronic thermometer purchased by NSS grant and stored in TL room (for NSS students—cooking devices or extra-curriculum activities)

Role of TL panel head as a leader

Manpower deployment

– mainly decided by principal, TL panel can give some advice

- e.g. one teacher teaches the same level in junior form, and teaching duty of the senior level rotates annually

Level	2011-2012	2012-2013	2014-2015
S4	Teacher A	Teacher B	Teacher A
S5	Teacher B	Teacher A	Teacher B
S6	Teacher A	Teacher B	Teacher A

Budgeting

– academic grant, consumable grant, cross KLA, cross curricular activities, fashion show, tours, visits….

Role of TL panel head as a leader

Promotion of TL

- Sharing / support from TL alumni
  - Be a tutor in extra-curricular activities
  - Be a helper in fashion show
  - Share experiences (answering techniques in DSE / revision skills / career prospects) with SS students
    - HKU : faculty of science major in food and nutritional science
    - IVE : applied science major in food and nutritional science
    - Poly U : fashion and textile (strong foundation in JS on fashion with articles / work to enrich portfolio for interview)

Collaboration with other KLAs / external organisations

- Examples in the latter part

SWOT analysis

TL C&A Guide:

3.3.2 SWOT analysis 「強、弱、機、危」分析

- In the process of formulating a strategic plan for the implementation of the curriculum, the
- following “strengths, weaknesses, opportunities and threats” matrix may be useful as a
- starting point for reflection. Teachers can identify the direction for curriculum development
- and find out how to build on the school’s strengths and improve the quality of student
- learning.

Figure 3.4 A “SWOT” Matrix 「強、弱、機、危」分析表

Strengths 強項	**Weaknesses** 弱項
Opportunities 機會	Threats 危機

SWOT analysis of TL

Strengths	Weaknesses
• cross subject / KLA collaboration e.g. Chemistry (food preservation), Biology (Chinese medicine for diet / methods of tenderizing meat) • experienced teachers • well equipped facilities / latest appliances • S2-S3 students have a whole academic year-strong foundation of TL in JS • Students are more competent and proactive in the presentation through OLE • sex ratio of students : 1:5(Male : Female) • TL remains as an elective subject in the transition from HKCEE to HKDSE	• misconception as a non-academic subject / nature of the subject as they do not understand the rational and value of TL for students, thus affect student's subjection selection • lack of career prospects • lack of teaching resources e.g . mock examination paper / exercise • Test / exam-oriented • small class size – not cost effective deployment of resources perceived by school management • shortage of TL teacher supply • Since 2014, 3→ 2 elective, more competitive for TL

SWOT analysis of TL

Opportunities	Threats
• SBA pilot scheme • PDPs organised by EDB for knowledge enriching and useful L&T materials from tertiary institutes • different visits / competitions / tours for students to gain more horizon-broadening experiences / creativity and insights • more issues and concerns on food safety and consumption have been raised by general public • great demand of trained manpower in the fashion industry and business • students have great concern on their personal image building • support from alumni	• shortage of TL teacher supply • do not offer SS_TL in 2015 (S4) • learning diversity will affect the result of HKDSE TL and impose extra burden on teachers

EDB One-stop portal

- **Assessment bank for TL**
  http://minisite.proj.hkedcity.net/edbosp-te/eng/home.html
- Your HKEdCity username and password are required as it is not accessible by students.

- **L&T resources for TL**
  http://minisite.proj.hkedcity.net/edbosp-te/eng/home.html
  Your HKEdCity username and password are required as it is not accessible by students.

  http://www.edb.gov.hk/en/curriculum-development/kla/technology-edu/resources/index.html

Catering for Learner Diversity

Common strategies

- Streaming
- Small class size
- Cooperative learning
- Individualised programmed learning
- Graded exercise
- Multiple tasks
- Co-teaching
- Enhanced “participated learning” through IT, drama
- Additional tutorial after class
- Graded test / assessment
- Enriched learning environment

Catering for learner diversity

- mixed ability groups (fashion design project)
  - Students of different abilities can learn well together (e.g. through co-operative learning)
  - Timely feedback (informal or formal) during learning and teaching processes
- Simplify some HKCEE HE / HKDSE questions
- Student assistant (teaching basic sewing and embroidery stitches)

Issues and Concerns

- **Curriculum Management**

  stakeholders (e.g. school management, subject teachers), resources availability & allocation)

- **Curriculum Planning**

  positioning, design of curriculum (modes, contents, time tabling, progression & articulation)

- **Curriculum Leadership**

  vision, attributes, competencies, communication skills e.g. inter-personal relationship

Curriculum Management & Planning

- **Systems thinking**

  (positioning, alignment with curriculum reform, school vision and mission)
- **Meeting student needs and developing their potential** (subject Vs OLE)
- **Flexibility** (e.g. time-tabling, room usage)
- **Creative problem solving** (e.g. cluster schools

Difficulties in curriculum planning

- Revising a curriculum every year (articles design in different levels)
  - S: discuss with other colleagues / observe the current trend
- Strengthening the academic performance in JS and SS
  - S:Theory lesson: theory + underlying principles of the food preparation skills

    Practical lesson: try-out + revision of theory + how the chosen dishes illustrate the theory
- Enriched TE curriculum in JS
  - S: EDB recommended us to include the topic of "Home management" next year for a balanced curriculum
- Poor ability to use statistical data (HKDSE / assessment) to make inferences for curriculum improvement
  - S: Seek for explanation from Science teachers

Curriculum Planning

- Relevant
- Meaningful
- Valuable
- Catering students' diversity
- Alignment with school vision and mission / development
- Preparation for Adulthood
- University admission

Principles of Curriculum Planning

- provide learning experiences for students with different abilities
- provide learning experiences for students with different inclinations
- Making student learning more meaningful
- Integrating conceptual learning with life-wide learning experiences
- Integrating learning with assessment

Enriched TE curriculum

- TEKLA is one of the eight KLAs and is the entitlement of every student.
- The TEKLA curriculum framework comprises six knowledge contexts
- The learning elements under the six knowledge contexts have been reviewed and elaborated, to explain the breadth and depth of the TE knowledge context. It aims to facilitate schools in providing a broad and balanced curriculum to help students lay a solid TE foundation on completion of junior secondary education.
- The learning elements are grouped into core and extensions within each of the six knowledge contexts.
- Modular approach is proposed in the Technology Education Key Learning Area curriculum

Enriched TE curriculum

Date	Progress
13 June 2012	The draft enriched TEKLA curriculum were finalised and confirmed at the CDCC(TE) meeting
7 September 2012	The draft enriched curriculum was issued to schools to solicit views from secondary schools (also available on the EDB webpage)
17 June 2013	The enriched TEKLA curriculum was received at the CDC Meeting
1 Aug 2013	The enriched TEKLA curriculum was issued to schools through EDBCM87/2013. It was also onto the TEKLA webpage.
From 2013 onwards	• Briefing sessions were conducted for the curriculum planning on the enriched TEKLA curriculum • Learning and teaching resources were provided to schools for their reference

Enriched TE curriculum

Information and Communication Technology	Materials and Structures	Operations and Manufacturing	Strategies and Management	Systems and Control	Technology and Living
K1- Computer Systems K2 - Programming Concepts K16 - Information Processing and Presentation	K3 - Materials and Resources K4 - Structures and Mechanisms	K5 - Tools and Equipment K6 - Production Process	K7 - Business Environment, Operations and Organizations	K8 - Concepts of Systems K9 - Applications of Systems	K10 - Food & Nutrition K11 - Food Preparation and Processing K12 - Fabric and Clothing Construction K13 - Fashion and Dress Sense K14 - Family Living K15 - Home Management and Technology
E1 - Computer Networks	E2 - Materials Processing	E3 - Project Management	E4- Resources Management E5 - Marketing	E6 - System Integration E7 - Control and Automation	E8 - Fabric and Clothing Construction E9 - Fashion and Dress Sense E10 - Home Management and Technology

Self-directed learning 自主學習

Laying a foundation for self-directed learning at an early stage and let them develop / stretch their potential at a later stage

Teacher-Directed		Self-Directed
What do STUDENTS need to learn?	⟷	What do I need to learn?
How will I know when THEY learned it ?	⟷	How will I know when I'VE learned it?
HOW will I monitor THEIR progress?	⟷	How will I monitor MY progress?
How will I HELP THEM learn it?	⟷	How will I learn it?

Self-directed learning

Metacognitive process

- Students plan, set goals, organise, self-monitor, self evaluate

Motivational process

- Students self motivate, have high self-efficacy, show perseverance in learning, take responsibility

Behavioural process

- Students employ strategies that help achieve the learning goals
- Adjust strategies or seek out new alternatives when encounter challenges in learning e.g. asking teachers or peers for advice, learning new skills, adjusting learning goal

Self-directed learning

Project learning / Problem-based learning

- set goal
- gather information and collect data
- analyse and synthesize information
- prioritize tasks and review
- communicate and present their ideas and findings.

Experiment (Enquiry approach)

students undertake inquiry to develop knowledge and understanding, in order to make better sense of the world

Teachers as facilitator of enquiry

- ‘hands-on’ scientific investigation
- identify questions
- formulate procedures
- test hypotheses, gather and analyse data
- draw conclusions.

Self-directed learning

Competitions

- students can have the opportunities to take up responsibility and to collaborate with other students in applying what they have learnt in solving real life problems in developing their interpersonal, self-management, critical thinking and problem-solving skills.
- provide students with opportunities to set goals, collect information, prioritize tasks and present their findings to the adjudicators and other participants, in collaboration with other students.

Self-directed learning

Promote the use of e-class and e-Learning

Self assessment (Use of assessment rubrics)

Examples of Dimensions / Category		
• Analysis • Application of subject knowledge • Application of skills • Attractiveness • Citation / documentation	• Designing • Evaluating • Eye contact • Grammar and spelling • Information seeking • Initiative	• Making • Organisation • Planning • Research • Selection of sources • Teamwork • Works independently

Reading to learn

Facilitating Measures to Foster Reading to Learn

1. Allocating time for reading 安排閱讀時間
2. Providing a conducive environment and atmosphere 營造有利閱讀的環境和氣氛
3. Sustaining motivation and interest in reading 提高閱讀動機和興趣
4. Providing a diverse and appropriate collection of reading materials 提供多元化和合適的閱讀材料
5. Using technology optimally 善用科技
6. Mobilising outside help 動員校外助力

Reading to learn

- S5: Book report on Food culture (2-3 times per year) / analysis of SCMP news articles with guiding questions
- Library books / Reference books: meal planning project / fashion design project (junior form)
- Websites: use of websites during lesson in JS and introduce to SS for reading / knowledge enriching e.g. GI value food from overseas websites / online e-publication from Centre for food safety

Vocabulary building

	Examples of food preparation utensils / equipment	Examples of fashion / textiles-related equipment
A	apple corer	
B	baking tin, blender, bread knife, butter knife	bobbin case, bobbin winder, buttonhole
C	can opener, chopping board, colander	
D	deep fryer, dessert spoon	
E	egg slicer, egg separator, electric cooker	embroidery machine
F	food processor, frying pan	fabric
G	garlic press, gas cooker, grater	
H	hand held mixer, health grill	hanger
I	Induction cooker	Ironing board, iron
J	juicer	
K	knife sharpener, kettle	
L	ladle	
M	measuring cup/jug/spoons, mortar	microscope
N		needles
O		
P	potato masher, pastry cutter, peeler	pin cushion, pinking shears, paper pattern
Q		
R	rice scoop	
S	sieve, steamer, spatula, saucepan	sewing machine, safety pin
T	tongs, tweezers, tablespoon	thread, tape measure, tracing wheel, tracing paper, tailor's chalk
U		
V	Vacuum flask	
W	whisk, wok	
X		
Y		
Z	zester	zipper foot

Bibliography for TL

Bibliography for Schools and Teachers (as at March 2015)		
Books		
TE/HEc,TL	1	林建煌。 (2008)。《消費者行為》。華泰文化。
TE/HEc,TL	2	陳瑩。 (2007)。《服裝設計師手冊》。中國紡織出版社。
TE/HEc,TL	3	Graham Allan.(2004). The Sociology of the Family. Blackwell.
TE/HEc,TL	4	Elle Whitney, Sharon Rady Rolfes. (2008). Understanding Nutrition. Thomson.
TE/HEc,TL	5	Peter S. Murano. (2003). Understanding Food Science and Technology. Thomson. Wadsworth.
TE/HEc,TL	6	Kittler, P. G., & Sucher, K. P.. (2008). Food and Culture (5th ed.).Thomson Wadsworth.
TE/HEc,TL	7	Proudlove, RK. (2009). The Science and Technology of Food. Forbes Publications.
TE/HEc,TL	8	Von Eberle. (2004). Clothing Technology. Verlag Europa-Lehnittel Nourney.
TE/HEc,TL	9	Sue Jenkyn Jones. (2005). Fashion Design. Laurence King Publishing.
TE/HEc,TL	10	Lesley Cresswell. (2002). Textiles at the Cutting Edge. Forbes Publications.
Journal (name & article)		
TE/HEc,TL	1	Textile Asia
TE/HEc,TL	2	Choice Magazine
TE/HEc,TL	3	Journal of Food Technology
Website		
TE/HEc,TL	1	The Design and Technology Association https://www.data.org.uk
TE/HEc,TL	2	British Nutrition Foundation http://www.nutrition.org.uk
TE/HEc,TL	3	Centre for Food Safety (HKSAR) http://www.cfs.gov.hk/eindex.html

e-Learning / e-resources

EDBCM 28/2015 The Fourth Strategy on IT in Education – Enhancing School's WiFi Infrastructure Expression of Interest

Objective: support schools to use e-Learning resources / e-textbooks in class

CITG (Composite IT Grant)資訊科技綜合津貼

- **Enhance WiFi infrastructure**
- **Replacement, acquiring and maintenance of mobile computing devices**

- **HEc / TL – Electronic Learning and Teaching Resources for "Diet and Meal Planning"** ***(released in Jan 2015, more to come)***

Self-directed learning

- Project learning
- Self evaluation after practical work / project
  - JS: star diagram in JS
  - SS: written self evaluation (process / product)
- OLE
  - Visit museums : Chinese costumes
  - Food competitions :
    - 仁濟醫院社會服務部 -- 「樂也盈」長者食譜設計比賽
    - 藝術科技教育中心 --「健康宴客菜」食譜設計比賽
    - 健康明智 -- 「健康飲食」食譜設計比賽
    - 煤氣中學明火煮食-- 「低碳健康」食譜設計比賽
  - Speech day : reception / serving

e-Learning

- e-class / e-platforms
- Websites used / shared with students at JS / SS

Fashion Design Project (S2)

- T shirt transform and Skirts or pants design project
- self-learning: students conduct research for ideas of transformation from websites / books and then carry out the transformation themselves
- Duration – whole semester
- Preparation for S3 fashion design project

Fashion Design Project (S3)

- Duration – whole semester
- Topic – free topic (eg The circus, Rose, Fairy, Marshmallow, Bat, Snake, Poker, Water droplets, Day and Night, Lock and Key)
- Fashion design portfolio helps students to apply / interview for fashion design course

Meal Planning Project (S3)

- Duration – 1 month
- Topics simplified from HKCEE HE past papers
- Practical examination

Cross KLA Collaboration

Making connections

- make connections of what they are learning in the HEc / TL curriculum more meaningful and relevant to their lives. e.g……
  - *English:* write instructional recipes with vocabulary building worksheets; study how the persuasive language used on menus or in food advertising can influence consumer choices
  - *Mathematics:* deal with mathematical information in the form of weight, measurement and time; interpret statistical information about health, such as rates of heart disease in the population; budgeting and financial planning
  - *Physical Education:* HEc promotes a healthy lifestyle that is reinforced in PE, make connections between physical health and good nutrition. A health fair can be organised in school to promote the health benefits of a balanced diet and an active life.
  - *Religious Education:* RE and HEc can be integrated by examining the significance of food in different religious contexts, such as Christmas, Easter
  - *Liberal Studies:* current issues / articles e.g.消費新潮 -- 衫衫不盡

http://programme.rthk.hk/rthk/tv/programme.php?name=tv/metroconsumer&p=6486&d=2014-11-18&m=episode Impact of fast fashion on the environment → sustainability and consumer responsibilities

Idiom Fun: Eat Your Words

Idioms & phrases

- not my cup of tea
- a piece of cake (容易)
- sell like hot cakes (暢銷)
- bread and butter (生計)
- the apple of his eye (心愛)
- in apple pie order (井然有序)
- cool as a cucumber (從容不迫)
- my salad days (少不更事的時期)

Oxford Advanced Learner's English-Chinese Dictionary

School policy

- ***School goals:***
  - To foster Chinese culture and civic awareness while emphasizing the five areas of moral, intellectual, physical, social and aesthetic development of students
  - To arouse students' interests in the appreciation of culture and fine arts
  - **Co-teaching with Biology** (Chinese medicine for diet)
    - ◆ Biology department – Recipe design contest
    - ◆ TL department – Functions of Chinese herbs and herbals soup
  - Target group: S5 students (Food culture - nutraceuticals)

- **Co-teaching with Biology**
  - ◆Biology department –Method of tenderizing meat in S3
    - ◆Experiment: Use of tenderizer to tenderize the pork
    - ◆Venue: TL room
  - ◆ TL department – Compare different methods of tenderizing meat in S2
    - ◆Experiment: Use different methods to tenderize the beef
    - ◆Practical: Rouladen

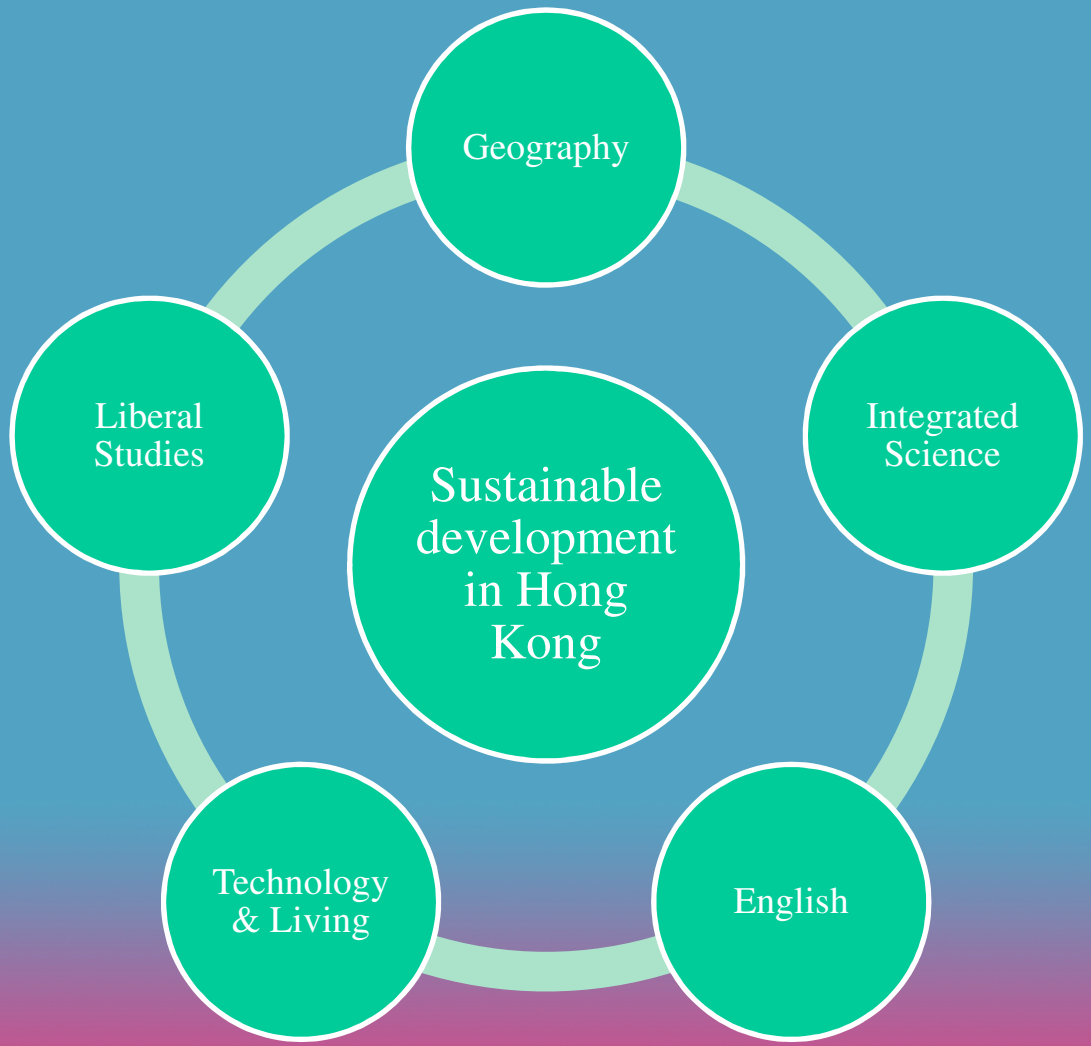
- **Co-teaching with Chemistry**
  - ◆Chemistry department – Food preservation
    - ◆Theory: Different types of food preservatives
    - ◆Experiment: Analysis of sulphur dioxide content in wine
  - ◆ TL department – Browning reaction
    - ◆Theory: Enzymatic browning and non-enzymatic browning
    - ◆Demonstration: Carmel ice cream
  - – Target group: S5 students

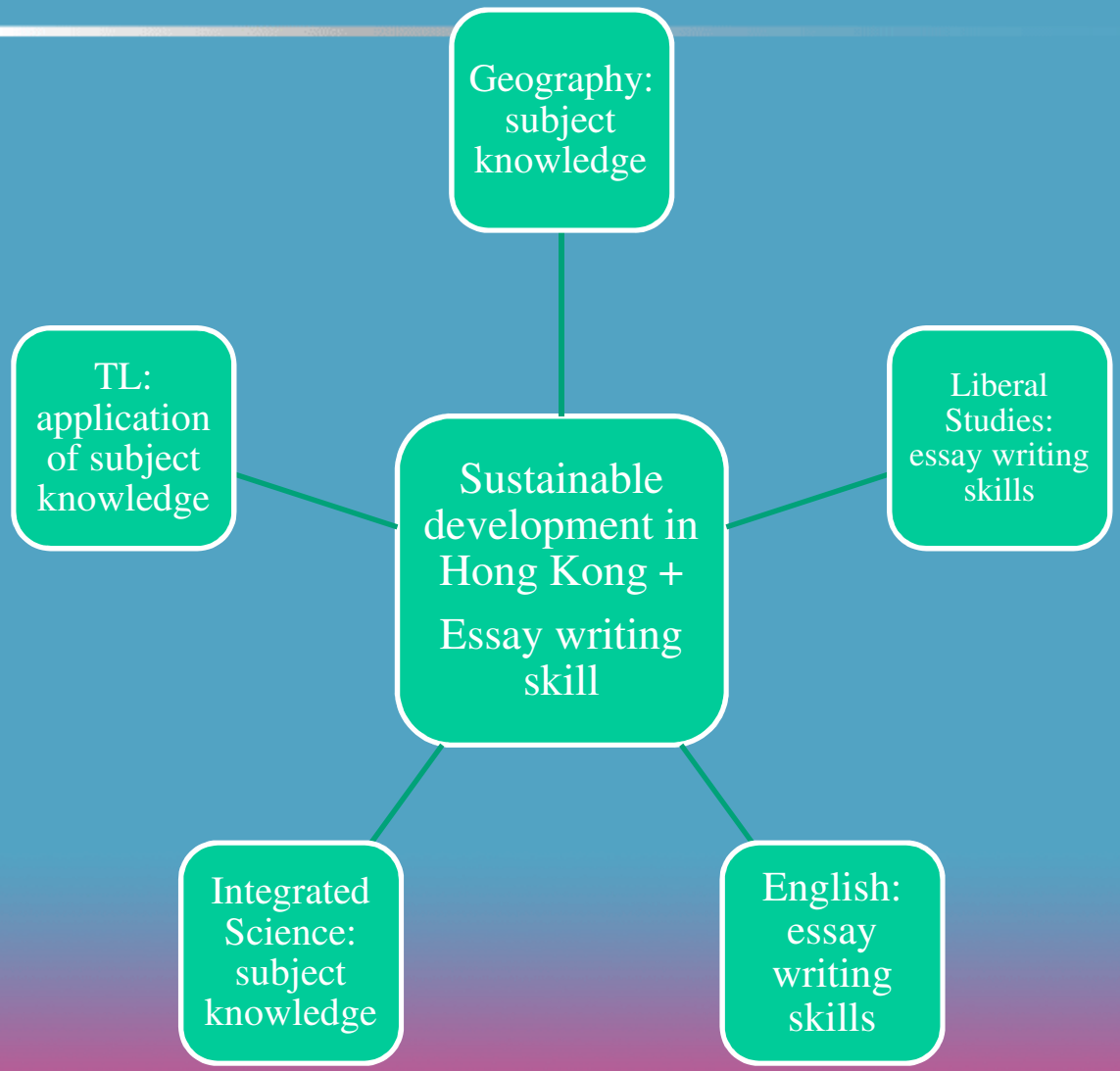
- ***School goals:***
  - ***To possess self-learning ability***
  - ***To apply information technology as a means of life-long learning***

S2 – Food product development project

- Co-teaching with English department
- English department – Vocabulary (name of ingredients and Italian dishes)
- TL department – Italian food culture, research, design and make dish, reasons for choice of ingredients and dish, written presentation
- Duration – Whole semester
- Topic: Healthy snack
- Fund-raising

Co-teaching with English, LS, Geography and IS




Geography: subject knowledge
TL: application of subject knowledge
Liberal Studies: essay writing skills
Sustainable development in Hong Kong +
Essay writing skill
Integrated Science: subject knowledge
English: essay writing skills

- Geography:
  - Subject knowledge: types of energy and sustainability
  - Essay writing development
- Liberal Studies:
  - Argumentative essay writing skills
  - Graph analysis skills

- English:
  - Vocabulary drilling (from Geography, Liberal Studies and Integrated Science)
  - Newspaper cutting
  - Comprehension
  - Composition (Letter to the editor)
    - Argumentative essay writing skill

- Technology and Living:
  - Application of subject knowledge (Geography, Integrated Science & Technology & Living)
  - Low-carbon poster design (S1)
  - Low-carbon recipe design (S2)
    - Low-carbon food selection
    - Low-carbon cooking method
  - Short essay writing: explanation of recipe design

Cross-curricular Collaboration

- ***School goals:***
  - To possess independent and creative thinking abilities;
  - To have a broad global outlook
  - **Co-operate with Integrated science**
  - **Science week :** Molecular gastronomy
  - Duration : 2 hours, after school
  - Target group: whole school (arouse student's interests in TL and make them aware of its linkage to Science)

- ***School goals:***
  - To possess independent and creative thinking abilities;
  - To have a broad global outlook
  - **Co-operate with Integrated science**
  - **Science week :** Shake shake ice-cream
  - Duration : 2 hours, after school
  - Target group: whole school (arouse student's interests in TL and make them aware of its linkage to Science)

- ***School goals:***
  - To possess independent and creative thinking abilities;
  - **Co-operated with Integrated science**
  - **Science week :** Fried egg on a piece of paper
  - Duration : 45 mins, lunchtime
  - Target group: whole school (arouse student's interests in TL and make them aware of its linkage to Science)

Other Learning Experiences (OLE)

- **School Mission**
  - To possess good communication skills and the spirit of cooperation;
  - **Co-operate with functional groups - Careers Section**
  - **Etiquette lunch Workshop**
  - Time: Lunch Time
  - Participants: All S4 students (126 in total, 12-13 students in each group)
  - S4 TL students are responsible for making dessert and present the history of Tiu Keng Leng
  - Target group: S4 students (career pathways related to TL)
  - Contents:
    - Etiquette: Introduction by teacher / oral presentation by students
    - Serving and Dining (sensory tasting) by students
    - Chit-chatting (Q&A regarding careers planning, multiple pathway, etc)

Collaboration with external organisations

- Visit to Hong Kong Yakult Production Plant
- Visit to Tao Heung Museum of Food Culture
- Visit to Calbee Production Plant
- Guangzhou Cultural Exchange Tour
- Secondary School Food Safety and Nutrition Labelling Quiz Competition
  - Information collected from the intranet / by post / PDP
  - Target group: S3 and SS TL students (SS_Food product development)
  - Objective : Subject promotion

Support Measures

Curriculum Materials / Documents

- SS TL Curriculum & Assessment (C&A) Guide
- TL English-Chinese Glossary of Terms
- Learning and Teaching Resource Packages
- TE Web-based resources
- TE Information booklet, Poster and CD-ROM
- EDB / TEKLA website

Learning Community

- Sharing and Reflection

Professional Development Programmes (PDPs)

- Seminar (briefing / sharing sessions)
- Workshop

References

- Reference books & journals
- Government & non-government reports & publications

E-learning tools

- Websites (local and overseas)
- Mobile apps

Community resources

Background

- STEM – Science, Technology, Engineering and Mathematics
- Introduced in 1990s by the National Science Foundation ,USA

2015 Policy Address

152. The EDB will renew and enrich the curricula and learning activities of Science, Technology and Mathematics, and enhance the training of teachers, thereby allowing primary and secondary students to fully unleash their potential in innovation.

152. 教育局會更新及強化科學、科技及數學課程和學習活動，並加強師資培訓，讓中小學生充分發揮創意潛能。

STEM in Hong Kong

- Science, Technology, and Mathematics (STEM) Education (科學、科技及數學教育) or 數理、科技教育

- Building on the existing strength on the good performance of students in Science, Mathematics and Technology

Promotion

- A cross-disciplinary symposium cum seminars (跨學習領域的專題研討會) on various themes for Teachers - 6 July 2015

- an integrative STEM Education Fair (**綜合學習博覽會**) for Students – 15 & 16 Jan 2016

- Collaboration with the Community - tertiary institutes and other organisations (e.g. Science Museum, Science and Technology Parks) to better support the STEM Education

STEM in TL

Junior Secondary	Senior Secondary (FST or FCT strand)
Example Students conduct food tests to investigate the functional properties of food such as egg, fat, starch and apply the findings in developing new food products / recipes.	**FOOD SCIENCE** e.g. experiments with discussion questions on (1) liquid nitrogen ice cream: a matter of changing phases, (2) seeing our senses work together, (3) whipping up the cream **TEXTILE TECHNOLOGY** e.g. experiments: (1) students are given samples of natural and synthetic fibres to identify, compare, and analyze the observable performance characteristics or traits of each fibre and/or fabric. Both the qualitative and quantitative information about each fiber or fabric can be used to draw conclusions about which fibres are best for specific end uses, such as jeans. The physical and chemical properties of fibers can be further identified through a burning test. (2) carry out the experiment testing various stain removal techniques and solutions. This experiment will require multiple samples of the stained garment in order for students to identify the best solution and develop a justification based on the evidence. Throughout this step, students apply appropriate procedures for the care of textile products