Part C: Project Details

Project Title: Developing Curriculum Leadership with Holistic Curriculum Planning in Science KLA under the New Senior Secondary Context

1. Background:

Under the NSS context, science learning and teaching is no longer organized in an intact structure which has been aligned vertically with learning stage of S1-S3 continued into S4-S6 and, horizontally primarily composed of the complementary subjects of Physics, Chemistry, and Biology (as well as Integrated Science). Correspondingly there will not be a so-called "science stream" of students in the new senior secondary stage anymore. Therefore, it is anticipated that these ecological changes will have much impact on science and mathematics instruction in schools. As suggested by the policy documents and Barber & Watts (1998), the role of science curriculum coordinators is of vital importance for fostering curriculum change at school level. The NSS Curriculum and Assessment Guide of the Science Education KLA suggested that the senior secondary subjects should build on the junior secondary Science Curriculum. The knowledge, concepts, process skills and generic skills between the two levels of study should be linked together properly. Thus schools and teachers are encouraged to:

- facilitate continuity with the junior secondary Science Curriculum through a comprehensive coverage of the learning targets to promote integrative use of skills and a balanced development of learning experiences;
- plan and devise appropriate and purposeful learning and teaching materials, practical work, scientific investigations and projects to develop students' knowledge and understanding, skills and processes, values and attitudes, problem-solving skills, critical thinking skills, creativity, and strategies for learning to learn;
- set and work on clear and manageable curriculum goals to develop a progressive and appropriate curriculum that serves to bring about pleasurable, meaningful and productive learning experiences;
- make flexible use of lesson time to facilitate learning; and
- review and plan the curriculum flexibly and make appropriate re-adjustments when necessary, taking into account the SBA implementation arrangements for the subject.

(Extracted from Chapter 3 of the C&A Guides of NSS subjects in Science KLA)

Other than linking together the two levels of the science curriculum, holistic curriculum planning also includes the horizontal dimension such as curriculum alignment of NSS subjects in the science KLA. Near the end of the first academic year of NSS, Hong Kong

Association for Science and Mathematics Education (HKASME) conducted a survey regarding the problems encountered by science and mathematics teachers in NSS context. It was found that the duties reported by the Science KLA Coordinators turned out to be a collection of diverse tasks. The comparatively common duty was "supervising laboratory technicians". Apart from the administrative routine of personnel management, there still lacks shared view among the professionals regarding the roles and responsibilities that a Science KLA Coordinator should take up for the enhancement of science learning and teaching. As reflected in the result of the survey, little attention was given to the professional collaboration within Science KLA and between different KLAs. It is desirable that the role of Science KLA Coordinator can be further manifested for what Dimmock (1999) proposes "....in building up the positive relationship between curriculum and learning efficacy, and between the staff professional development and teaching effectiveness". In Hong Kong, the successful experience in the establishment of Curriculum Coordinator in primary schools proved that the curriculum managers with good strategic intents and empowerment can boost up the efficacy of implemented curricula and bring schools favorable student learning outcome.

It is nice to see that the policy designers have an aligned and promising view on curriculum leadership in the current NSS reform (Curriculum Development Council, 2009). The policy document "Senior Secondary Curriculum Guide - The Future is Now: from Vision to Realisation (Secondary 4 - 6)" signifies the importance of "building learning-centred leadership", where the roles of KLA coordinators are concertedly discussed in areas of staff professional development, allocation of resources and establishment of promising school culture to support the teaching efficacy and all-rounded student development. Apparently, the expectation on curriculum leaders, including KLA coordinators, is higher ever before. Also, the demand on KLA is entailed not only in curriculum reform, but also in school development and managing changes. HKASME is a professional organisation for all science and mathematics teachers in Hong Kong. **Encountering the changes under the NSS context, the Association is prepared to work together with frontline teachers to foster curriculum leadership and also professional collaborative culture using school-based approach.**

2. Goal and Objectives:

The goal of this proposed project is to develop curriculum leadership and enhance professional capacity to promote science education in schools under the NSS context. With the participation of 5 schools and 18 months, HKASME will:

- set up the links among all the NSS subjects of science KLA offered by the schools at curriculum planning level;
- develop optimum school-based curricula to cultivate science literacy for all students;

- enhance the professional capacity of science development in schools including teachers' understanding of other science curricula beyond their original specialized subject;
- develop school-based exemplars regarding the strategies to enhance collaboration amongst teachers for promoting science education;
- identify both internal and external factors shaping the science curriculum development in schools;
- develop teacher network with the focus on curriculum leadership and collaborative culture; and
- disseminate the messages and practical knowledge regarding collaboration amongst science teachers under the NSS context and good practices developed in this project.

3. Targets and expected number of beneficiaries:

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- Participating schools: 5 secondary schools
  - (i) Ma On Shan St. Joseph's Secondary School
  - (ii) PLK Yao Ling Sun College
  - (iii) Pentecostal School
  - (iv) Assembly of God Hebron Secondary School
  - (v) Po Kok Secondary School
- Secondary science teachers: about 50
- Secondary students: about 5,000

It is expected that all secondary schools will benefit from the experiences and knowledge generated of this project.

4. Involvement of teachers and principals in the project

4.1 Steering Committee

The Project leader, will be the chairman of the committee. Both the principals/representatives of the participating schools and the chair-person/representative of HKASME will be members of the committee. There will also be experts from tertiary education in the committee. At present, has already promised to be a committee member. In addition, two schools have promised to be the participating schools. Representatives from the CDI will also be invited to join the Steering Committee after the approval of this project. It is estimated that the committee will have meeting every six months. The duties of the committee are to:

- Oversee, supervise and monitor the network, including the progress, finance and personnel affairs;
- Give advice and comment on the strategies and implementation of project in schools; and
- Develop relevant strategies for disseminating the experiences and knowledge

generated in this project.

4.2 Working Committee

The working committee will continue to perform their roles in this project. The Project Leader will be the chairman of the committee. Science coordinators of the participating schools and the project consultant will be the members of the committee. The members from steering committee are welcome to join. Regular meetings will be held throughout the project period and will be held once every three to four months.

The duties of the working committee are to:

- discuss the strategies to promote collaboration culture in science KLA in schools;
- exchange school experiences regarding and developing holistic curriculum plan and promoting science education;
- work with the consultants refine the best practices;
- give presentation on disseminating the professional experiences developed in this project; and
- evaluate the effectiveness of this project.

4.3 Role of Science Coordinator of participating schools

The science coordinator of the participating schools are expected to:

- set up a working frame to develop horizontal and vertical links with the curricular in science KLA;
- meet the consultants from time to time to discuss ideas and strategies regarding school-based curriculum development;
- conduct 4 to 6 school-based meetings to plan, develop, discuss and review the progress;
- participate in 3 to 5 working committee meetings organised by the consultants for exchange of experience;
- to share school experiences to all science teachers in Hong Kong. Two to three seminars will be organised by the Association; and
- meet the consultants from time to time to discuss and construct the school cases.

4.4 Role of the science teachers of a participating school

The science teachers of the participating schools are expected to:

- join 4 to 6 school-based meetings to develop, discuss and review the progress;
- assist the science coordinators to implement the plan;
- assist the consultants and science coordinator to construct the school case; and
- assist the science coordinator to prepare experience sharing in teacher seminars.

4.5 Role of Project Consultant

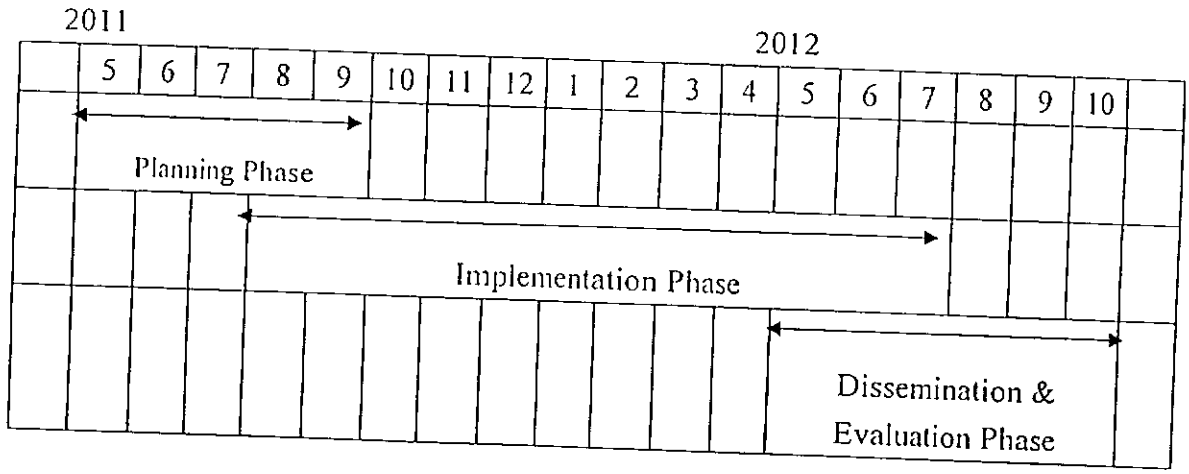
Project consultants will be recruited by the Association to provide participating school teachers with both advice and training programme, which are to equip science coordinators and teachers with the curriculum knowledge for enhancing their professional capacity. Training can be in the mode of school-based activity as well as at the level of teacher network to enhance sharing culture both within and among schools. There will also be seminars conducted for schools in Hong Kong. In addition, the consultants will also help schools to construct school case to illustrate the development of curriculum leadership and also collaborative culture. Thus the project consultant(s) is/are expected to:

- meet the project leader and the representatives of the Association to discuss and review the plan and progress;
- meet the science coordinators from time to time to advice the development of school-based curriculum and promotion of collaborative culture in science KLA in schools;
- join steering committee meetings to report progress of the project;
- facilitate the discussion in the working committee meeting;
- provide teacher with training programme regarding curriculum knowledge; and
- write the school cases study report regarding the development of curriculum leadership and collaborative culture.

5. Implementation plan with time-line

5.1 Strategies for establishing the collaborative relationship

Fundamental to the strategies for developing collaborative relationship and interactions for equipping teachers with curriculum knowledge and leadership is a school-centred principle, that is, all interactions and actions will be geared to the individual schools' goal and needs as defined by the school personnel. The interactions will be at two levels: namely, inter-school and intra-school. At inter-school level, based on preliminary investigation, the common theme is the arrangement of the Secondary 3 science curriculum. Since different schools adopt different models of Secondary 3 science curriculum under different school contexts, these may reflect both the structure and culture of science departments in schools. In addition, Secondary 3 science curriculum is the interface between junior and senior secondary science education. The focus on Secondary 3 science learning is critical. At intra-school level, we use school-based approach embedded within three main phases: planning, implementation, dissemination and evaluation. The implementation is planned to start at May, 2011 with time-line as follows.



(i) Planning Phase: (month 1 – 5)

- Stocking-taking: investigate what are the ecological changes in the participating secondary schools encountered by school personnel including administrators, teachers and supporting staff, in particular, the perception of teachers of science-related subjects will be sought. The impact of the changes will be assessed. The selection of the participating schools is guided by the extent to which the school culture and leadership are supportive regarding curriculum and organisational reform.
- Gaining access to the fields: Establishing collaborative relationship with administrators, teachers and supporting staff of each school.
- To define the role of curriculum leadership and the organisational structure of the Science KLA teaching team through action and reflection.
- To identify curriculum issues in NSS Science-related subjects in each school
- To identify the opportunities for enhancing collaborative culture for promoting science education in schools.
- To plan tasks regarding the development of collaborative culture.

(ii) Implementation phase (month 4 – 15)

- To identify the knowledge or skills gap amongst the subjects of science KLA offered in schools
- To discuss the ways to fill up the gaps at curriculum planning level.
- To implement the tasks regarding the development of collaborative culture.
- To put into practice and identify effective measures, which will be developed and re-formulated in the light of formative evaluation.
- To collect information for constructing school cases to illustrate the factors shaping collaborative culture and curriculum leadership.
- To organise sharing of experience from time to time among the Coordinators as well as members of the teaching teams of the collaborating schools

(iii) Evaluation and Dissemination phase (month 13 – 18)

- To construct school cases with the experiences and knowledge generated in the project to illustrate the factors related to the development of curriculum leadership and collaborative culture.
- To share school stories regarding the development of curriculum leadership and collaborative culture in teacher seminar.
- To perform summative evaluation of the action research in each school and formulate change for improvement.
- To be evaluated by the attendants of presentations in dissemination seminars.

5.2 Conceptual framework for cultivating science literacy

Scientific literacy refers to students' scientific knowledge (of science as well as in science) and use of that knowledge in encountering scientific issues. It involves both the cognitive aspect which refers to the understanding and application of the knowledge, and the affective aspect which refers to the willingness and interest in engaging in scientific ideas and activities. Therefore, cultivating students' scientific literacy within the school context pertains to initiating students into learning experiences that could effectively enrich **cognitive aspects** and stimulate the **affective aspects** of scientific literacy.

a) Regarding the **cognitive aspects**, developing the habit of mind and of behaviour pertaining to a scientific literate person requires a long time for habit formation and disciplined training; to this end the formal curriculum is the arena. Moreover, in the context of a secondary school, this development should begin in the junior secondary stage, where the students are more susceptible to training, the examination pressure is not so heavy, and more time for habit formation.

b) Regarding the **affective aspects**, the co-curriculum extends the students' horizon in developing their competencies while the formal curriculum should provide opportunities for developing the basic competencies. With relatively less constrains and boundaries, the learning experiences of co-curriculum is especially useful in developing the affective aspect and to be an interface for the transformation of school knowledge to real-life knowledge.

6. Expected deliverables and outcomes

The project is expected to have impact on both the development of Science KLA in Hong Kong education sector and the participating schools. The expected outcomes and deliverables

are as follows.

- Five School-based Holistic Curriculum Plans (both vertical and horizontal) in Science KLA will be prepared
- Curriculum materials to promote science learning in schools
- The school experiences regarding the development of collaborative culture and curriculum leadership are compiled into Cases for other schools as reference
- At least 3 teacher training seminars will be organized to disseminate the experiences, knowledge and materials generated from this project.

7. Readiness of the applicant organisation for undertaking the project

Hong Kong Association for Science and Mathematics Education was founded in 1964 to promote science and mathematics education. We are a registered non-profit making and charitable professional organisation for all science and mathematics educators in Hong Kong. In the past, the Association has made contributions to science education in Hong Kong with a wide range of professional works, including the development of science and mathematics curriculum materials, the diversification of curriculum, the promotion of international activities related to science and mathematics, research studies and teacher induction and in-service education. At present, membership stands at about 700, comprising mainly physics, chemistry, biology, mathematics and integrated science teachers from secondary schools. The Association has good experiences in developing science curriculum initiatives and has an expert pool consisting of experienced teachers and professionals. Apart from this, the Association is a good platform to disseminate good practice in science and mathematics education.

Under the NSS context, the Association feels the need to undertake this project under QEF and in the long-run to provide schools in Hong Kong with good exemplars of curriculum leadership and collaborative culture in Science KLA. Thus the Association has firstly invited two secondary schools to participate in this project. These two schools have good experience promoting scientific literacy and keen on the development of science education.

Participating School	Name of Principal
Ma On Shan St. Joseph's Secondary School	
Po Leung Kuk Yao Ling Sun College	

It is worth noticing that the principals of both schools,

are experts in science education. Both of them have served Science KLA committees of Curriculum Development Council many years. They know the development of science

curriculum well. While has been a science teacher trainer in university, is the author of a book regarding the theory of school change. Thus our team is composed of experts.

To ensure the proper management and success of the project, the Association has invited highly qualified and experienced educators, namely the project leader, and steering committee member, to lead and facilitate this project.

8. **Tentative Budget with detailed breakdown**

Item	(HKD)
Staff Cost: - 1 full time liaison officer (net salary + MPF)	($13,400 x 18 months)x1.05 = $253,300
Subtotal	$253,300
Equipment: • computer with printer • video camera • software for editing video • miscellaneous such as stationery, postage etc.	$7,000 $4,500 $5,000 $4,000
Subtotal	$20,500
Services: (a) The service fee is mainly for paying consultancy and teacher training. The number of hours are estimated as below: • advising the five participating schools individually (about 40 hrs x 5 = 200 hrs) • professional development (about 24 hrs) • attending meetings (about 88 hrs) • writing school cases (about 100 hrs)	$800 x 452 hrs = $361,600
(b) Internet Services (18 months)	$4,000
(c) for hiring services from supply/substitute teachers and teacher assistants to release the science coordinators and teachers to work for this project, such as attending meetings, curriculum planning and implementing, developing curriculum materials and sharing their experiences (no more than 75 man-days per school)	$85,000 x 5 schools = $425,000
Subtotal	$790,600
Contingency: about 2.5% is reserved for an adjustment of inflation	$20,000
Subtotal	$20,000
Total	**$1,084,400**

9. Assets Usage Plan

Category	Item / Description	No. of Units	Total Cost	Proposed Plan for Deployment *(Note)*
Audio and Video Equipment	Video Camera	1	4,500	*Will be kept for QEF at least Three years*
Computer Hardware	Computer with Printer	1	7,000	*Will be kept for QEF at least Three years*
Computer Software	Software for editing video	1	5,000	*Will be kept for QEF at least Three years*

(Note: for use by school / organization in other project activities upon project completion)

10. Report Submission Schedule

The grantee commits to submit proper reports in strict accordance with the following schedule :

Project Management		Financial Management	
Type of Report and Covering Period	Report Due Day	Type of Report and Covering Period	Report Due Day
Progress Report 1/5/2011 - 31/10/2011	30/11/2011	Interim Financial Report 1/5/2011 - 31/10/2011	30/11/2011
Progress Report 1/11/2011 - 30/4/2012	31/5/2012	Interim Financial Report 1/11/2011 - 30/4/2012	31/5/2012
Final Report 1/5/2011 - 31/10/2012	31/1/2013	Final Financial Report 1/5/2012 - 31/10/2012	31/1/2013

11. Evaluation of Project Impact

(a) Evaluation parameters and method

A comprehensive, systematic and evidence-based evaluation from various perspectives will be employed. The following four components to be evaluated are:

- **Curriculum Plan.** Five school-based curriculum plans in science KLA will be generated in this project and curriculum experts will be invited to give comments on the content quality.
- **Promotion of Science Learning.** Curriculum materials will be developed to promote

science learning in schools. Students' performance will be documented for the evaluation of learning and teaching effectiveness.

- **Practitioner.** Data will be collected from the school coordinators and teachers of the participating schools for analysis.
- **Teacher Seminar.** The school experiences will be translated into be case study reports for other schools as reference and will be disseminated in teacher seminars. A survey will be conducted among teachers to evaluate the project impact on the education sector.

(b) How the project would benefit the education sector as a whole

This project will help the education sector take a fresh look at the NSS science curriculum reform and development of curriculum leadership.

- It will support the implementation of **holistic curriculum planning** in Science KLA under the NSS context.
- Based on extensive school-based study with science teachers under the NSS school context, it provides the education sector with **school cases/stories** for colleagues to discuss and reflect with the theory of change.
- A set of **curriculum planning tools and strategies** will be generated from this project for the education sector as useful resources.
- The project will end at mid 2012. The knowledge generated from this project will provide **curriculum review** of NSS Science KLA with useful information as reference.

12. Sustainability of the outcomes of the project

The Association is professional organization for all science and mathematics teachers in Hong Kong with about 700 members. We have a wide range of teacher activities regularly to promote science education and teaching professional. The experiences and knowledge generated from this project will be further developed beyond the funding period. To achieve this, teachers joining the dissemination seminars will be invited to join the association to further develop the holistic curriculum planning for their schools. Thus the momentum of this curriculum initiatives will be grow up and have long-term impact on the education sector, especially in the science KLA.

13. Dissemination/Publicity

The dissemination methods include:

- Dissemination seminars and conference promotion
- Curriculum plans and materials will be posted on the Association's website
- School cases/stories with analysis will be reported in the Journal of the Association

named 'Hong Kong Science Teachers' Journal which is published annually.

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