M: FR/E

Final Report of Project	Project No. : 2007 / 0195

Part A

Project Title: Preparing Teachers for Teaching Ideas about Science in the New Senior Secondary Curriculum - A Dual Approach

Name of Organization/School: Division of Science, Mathematics and Computing, Faculty of Education, The University of Hong Kong

Project Period: From September, 2008 *(month/year)* to November, 2010 *(month/year)*

Part B

1. Attainment of objectives (based on the objectives stated in project proposal)

Objective statement	Activities related to the objective	Extent of attainment of the objective	Evidence or indicators of having achieved the objective	Reasons for not being able to achieve the objective, if applicable
1. To help setting up networks of teachers to teach Ideas about Science	Activities carried out throughout the whole project period are related to these objectives	Fully achieved	Please refer to Part (4) Deliverables and modes of dissemination; responses to dissemination and Part (5) Activity list of this report for the evidence. Please also refer to the appendices 2, 3, 5 and 6.	
2. To create and sustain a community of teachers who are enthusiastic to teach Ideas about Science		Fully achieved		
3. To produce 6 video-based DVDs on *"Learning to Teach Ideas about Science"* to enrich the pool of local curriculum resource materials for teacher training		Fully achieved		
4. To disseminate the video-based DVDs	Dissemination seminar held on 9 October 10	Fully achieved		

Project impact on professional development, school development, and learning effectiveness

a. Project impact on professional development

- Six teacher training workshops were conducted at the beginning of the project to broaden the knowledge of science and liberal studies teachers on ideas about science and to develop their relevant pedagogical skills. An evaluation questionnaire was completed by the participants after the workshops. As indicated in the results, most teachers agreed that the workshops had enriched their knowledge and skills of teaching ideas about science, and most of the teachers were satisfied with the workshop (For details of the questionnaire, please refer to Appendix 1; for teachers' responses to the questionnaire, please refer to Appendix 2).

- A total of 77 trial lessons on teaching ideas about science were conducted. When trying out their ideas, participating teachers worked with the university project members and their colleagues to refine and further develop the curriculum resources for teaching of ideas about science. Then they implemented the lessons and obtained feedback from the university project members and from their peers. All these activities supported these teachers' in developing their expertise to design learning and teaching activities catered for their students.

- In Approach 1 (subject-based approach), a number of video-based meetings and workshops, including 13 study group study meetings and 4 thematic workshops were organized to facilitate participating teachers to conduct systematic discussion and reflection on their lesson videos. At the end of the meeting, teachers were asked about their learning in the meetings. Their reflections indicate that these activities contribute to their gains in knowledge and pedagogical skills necessary for effective teaching of ideas about science as required by the NSS curriculum (Please refer to Appendix 3 for examples of teachers' reflection). Approach 1 also provided the context for a doctoral study of teacher learning in learning how to teach ideas about science. Preliminary findings suggest that teachers learned in three domains: knowledge, skills and confidence.

- In Approach 2 (school-based approach), preparatory meetings were held with the participant schools to discuss about the curriculum planning. Forty-four mentor-mentee meetings were carried out to guide and facilitate teachers in developing and refining the learning materials and activities. Thereafter 33 trial lessons were conducted with the support of the project staff. Eleven school-based workshops were organized to sharpen teachers' pedagogical content knowledge in teaching ideas about science with the use of the videos taken from the trial lessons.

- With the support of the project team in Approach 1, teachers from different schools had the opportunities to share and discuss on teaching ideas about science. We have effectively provided a platform to science teachers to broaden their understanding of teaching these concepts and facilitate their teaching. Similarly in Approach 2, the science and liberal studies teachers of the same school could gather, share and discuss their lessons with the others. This provided the conditions necessary for the collaboration within schools.

- The dissemination seminar was conducted on 9 Oct 2010. More than 200 local science and liberal studies teachers attended this seminar and learned from the teachers' sharing on their experiences of teaching ideas about science. The evaluation questionnaire was administered at the end of seminar, and the results indicate most of the teachers were satisfied with the seminar (Please refer to Appendix 4 for details of the questionnaire; refer to Appendix 5 for teachers' responses to the questionnaire). The QEF officer, Ms Maria Luk, who attended the seminar highlighted in her visit report that the event was well organized. She commended that the keynote speeches and teachers' experience sharing were thought-provocative, and as evident from our presentations, 'clusters of enthusiastic teacher network in science education were formed'.

- Overall speaking, the participating teachers and schools expressed satisfaction to the project organization and its professional development activities (Refer to Appendix 6 for teachers' feedback at the end of the project). When teachers were asked about their opinions in the final evaluation questionnaire and interviews, they agreed that trying out their ideas in class with the support of the project members was crucial in learning to teach ideas about science. Moreover, making use of lesson videos in the workshops served a good foundation for review and discussion with the other participants. The meetings and discussions also provided a platform for them to share inspiring ideas and to receive feedback from their peers and the project members.

- Looking forward, the DVDs, with a lot of exemplary practices on teaching ideas about science arranged in themes (Please refer to section 3 on deliverables for details), have greatly enriched the local curriculum resources for teacher education in this area. These are made available to all science teacher educators in Hong Kong. We have confidence that our model of teacher professional development has set very good examples for our peers, in particular, the use of video for enhancing teacher professional development. We have plans to consolidate our experiences and publish them for wider dissemination beyond Hong Kong.

b. Project impact on school development

- In the process of conducting trial-run lessons, the university project members worked with participating teachers to refine and further develop materials for teaching ideas about science. These revised and newly developed teaching materials can be part of the school-based resources of teaching ideas about science for the schools joining this project. Some of these are also incorporated in DVDs for wider dissemination.

- In this project, 28 teachers participated in the study group study meetings and the thematic workshops of the subject-based approach, and 19 teachers from three different schools participated in school-based workshops of the school-based approach. These meetings and workshops encouraged the participants to share and discuss their views on teaching ideas about science. They also served as a platform to create and sustain local communities (across schools in Approach 1 and across subjects in Approach 2) of teachers who are enthusiastic to teach ideas about science. Teachers participated in the school-based approach commented that the project has provided them with more opportunities to collaborate with their colleagues from other subject disciplines which they valued very much. Hopefully, our project have sowed seeds for more school-based collaborations and hence school development.

c. Project impact on learning effectiveness

- Teachers joining this project conducted a large number of trial lessons to teach ideas about science. Through these lessons, students' understanding of ideas about science was enhanced as evident from their pre- and post-lesson learning portfolios that the project designed together with the teachers. In addition, as inspired and advocated by our project staff, frequent use of formative assessment strategies by the teachers were also evident from the lesson videos. (Please refer to DVD 3, especially on the theme *Assessing students' understanding of ideas about science*). As suggested by the literature, teaching ideas about science can improve students' interest in learning science. This is also evident from many of the lesson videos included in the DVDs.

2. Cost-effectiveness - a self-evaluation against clear indicators and measures

- Utilization of available resources – At times, there were trial lessons taking place at the same time, in which existing video equipments from either the participating schools and/or the University were deployed for recording of the lessons. The university venues for the training workshops, study group meetings, thematic workshops, as well as the large lecture theatre used for the dissemination conference, were all used free of charge. Office space for project staff was also free of charge. Curriculum materials developed in a previous QEF project and a EDB sponsored project were also used as stimulus materials in the teacher workshops, as well as during the initial discussion with teachers during the lesson planning stage. All the above measures have increased the cost-effectiveness of the project.

- There were about 900 headcounts of teachers attending various meetings and functions of the project. There were altogether 77 trial lessons. This resulted in about 2700 students (assuming 35 students per class) benefitting directly from the project through receiving a better science lesson. All science educators in Hong Kong (about 30) benefitted from the project by receiving 6 DVDs which they can make use of in their teacher education course. All secondary schools (about 400) in Hong Kong received a set of the DVDs which can be used for school-based staff development. In sum, it is rather meaningless, if not devaluing, what we have achieved by determining the unit cost (less than $500 per head count) for the direct beneficiaries of our project.

- Sustainability of the materials developed – The materials included in the 6 DVDs are highly sustainable in the senses that they are usable by all secondary school teachers of relevant subjects and are not intrinsically "dated". Moreover, teachers can modify the materials included in the DVDs to suit their own teaching without the need to inject a large amount of time and financial cost. Furthermore, the online version of the DVDs to be mounted in Education City will make this project reach not only local audiences, but also overseas science teachers and researchers.

- Alternative approaches for equivalent benefits at less cost – We can't think of cheaper alternatives. In fact, many of our colleagues regarded serving this project as a kind of community service and received sub-standard payment. In addition, many of the rental charges for meeting venues and office space were waived.

- In sum, the actual expense of the project is very close to and does not exceed the approved overall budget. The over-spending in the category of general expenses is allowed according to the QEF regulation. It shows that the budget control of the project is well done.

Budget Checklist

Budget Items *(Based on Schedule II of Agreement)*	**Approved Budget (a)**	**Amended budget (b)** Remarks: The amendment of the budget has been formally approved by QEF committee during the project period (Appendix 7).	**Actual Expense (c)**	**Change [(c)-(b)]/(b) +/- %**
Staff Cost	1,834,308	1,814,400	1,790,560.95	-1.32%
Equipment	49,500	39,500	38,827.00	-1.70%
General Expenses	50,000	80,000	89,657.05	+12.07%
Total	1,933,900	1,933,900	1,919,045.00	-0.77%

3. **Deliverables and modes of dissemination**

- Project members worked collaboratively with more than 40 teachers to plan, teach and videotape lessons with ideas about science infused, as well as to jointly review and reflect on the lesson videos afterwards. The joint effort culminated in the production of the following set of DVDs containing all the teaching and learning activities mentioned above with corresponding video exemplars was produced. A total of 1000 sets of DVDs were produced and sent to all local secondary schools and interested parties like Curriculum Development Institute, Hong Kong Examinations and Assessment Authority, as well as other teacher education institutions. These DVDs are the key deliverables of the project. Details of this set of DVDs are as follows:

DVD 1	**Teachers' experiences in learning to teach Ideas about Science (IabS))** This DVD aims to provide an overview of how our participants learn to teach ideas about science in the project, starting from the teacher training workshops, lesson planning, implementation, discussion on their lessons and participating in various meetings and workshops. Exemplary videos of lessons and relevant discussions are included.
DVD 2	**Learning to teach I*ab*S through themes** • *Introducing students to IabS* • *Probing students' understanding of IabS prior to the lesson* This DVD shows how the teachers conduct their lessons to introduce the ideas of science to their students, and to make use of students' ideas collected prior to the lessons to teach the concepts. The viewers can carry out self-directed learning according to the background information, guiding questions, lesson videos and the commentaries provided in each case.
DVD 3	**Learning to teach I*ab*S through themes** • *Developing students' understanding of IabS* • *Consolidating students' understanding of IabS* • *Assessing students' understanding of IabS* This DVD consists of vignettes of classroom videos arranged in three themes: to develop their students' understanding of ideas about science, to consolidate their understanding through different classroom activities and tasks, as well as to assess their understanding after the lessons. Similar to the previous DVD, the viewers can carry out self-directed learning according to the background information, guiding questions, lesson videos and the commentaries provided in each case.

DVD 4	**Learning to teach *IabS* through themes** • *Critical incidents in teaching IabS* • *Teaching IabS beyond the knowledge domain* This DVD highlights some critical incidents teachers may need to act immediately on unexpected circumstances in teaching ideas about science. Moreover, the objectives of teaching ideas about science in the skills and attitude domains are illustrated with teachers' exemplary practices in the videos. The viewers can carry out self-directed learning according to the background information, guiding questions, lesson videos and the commentaries provided in each case.
DVD 5	**Teaching *IabS* in Physics lessons** This DVD provides lesson video episodes on Physics topics such as momentum, inertia, latent heat and a social-scientific issue 'Technology in sports'. The viewers can observe the pedagogies employed for teaching ideas about science in Physics lessons.
DVD 6	**Teaching *IabS* in Chemistry lessons** This DVD provides lesson video episodes on a few Chemistry topics, namely chemical bonding, models in teaching Chemistry, the concept of mole, periodic table and a social-scientific issue 'Say No to drugs'. The viewers can observe the pedagogies employed for teaching ideas about science in Chemistry lessons.

- A dissemination seminar was held on 9 Oct 2010. Over 230 teachers and guests (from EDB, HKEAA, HKIEd, etc.) attended the seminar (Please refer to Appendix 8 for the details of the seminar). All attendants and guests were given a copy of the DVD. Teachers joining this project shared their experiences in teaching ideas about science during the seminar.

- One copy of the DVDs was distributed to each secondary school (over 500 schools) in 10 Oct 2010. Extra copies were available on request.

- The contents of these DVDs will be uploaded to HK Education City (www.hkedcity.net) for teachers to get access to the content of this set of DVDs so as to maximize the impact of our project deliverables.

As acknowledged in the DVDs, a major element that has contributed to the success of our project is the courage of the participating teachers in not only trying out different kinds of teaching of which they had little or no experience, but also allowing their lessons to be videotaped, and viewed publicly. This very act of agreeing to open up their classrooms for sharing and contributing to the professional development of fellow teachers can be attributed to the trust and rapport built between us and the teachers over the two years of the project. In particular, we have been conveying to teachers a message that we genuinely want to work *with* them to explore ways of improving their teaching. Instead of simply telling teachers what to do, we want to accompany them through every step from the beginning of planning a lesson to teaching it, followed by post-lesson discussion, analysis of the lesson video on multiple occasions during meetings of the lesson study and thematic workshop. In short, we believe that it is work with heart on both parties that has contributed to the success of the project. Given the trust and rapport that we have built among the teacher members and the university members over the two years, due efforts will be paid to sustain this teacher network for future inquires of innovative teaching after completion of the project.

4. Activity list

- During the period of the project, the major activities were:

Approach 1

- 2 briefing sessions for teachers joining Approach 1 for explaining the details of this programme
- 2 facilitator meetings for investigators and facilitators to discuss issues related to Approach 1
- 3 planning meetings for setting up study groups and discussing trial lesson schedules
- 44 trial run lessons carried out by teacher participants of Approach 1
- 44 post lesson discussions
- 13 group study meetings
- 4 thematic workshops

Approach 2

- 10 preparatory meetings for schools joining Approach 2 for teaching schedules and design
- 33 trial lessons carried out by teachers in Approach 2
- 44 mentor-mentee meetings
- 11 school-based workshops

For both approaches

- 3 teacher training workshops before trial lessons for consolidation of knowledge on ideas about science
- 3 teacher training workshops for enhancing the pedagogical skills of teaching ideas about science
- 4 meetings of all project staff to discuss the design of DVDs
- 1 seminar to disseminate the DVDs of effective teaching of ideas about science

- Details of the major activities are listed in the table below.

Activities	Date	Time	Venue	Number of participant
Briefing session I	18 Oct 08	2:00 pm - 4:00 pm	Runme Shaw Building, HKU	12
Briefing session II	25 Oct 08	2:00 pm - 4:00 pm		13
Training workshop of enhancing the knowledge on nature of science I	12 Dec 08	9:30 am - 4:30 pm		40
Training workshop of enhancing the knowledge on nature of science II	13 Dec 08	9:30 am - 4:30 pm		35
Training workshop of enhancing the knowledge on nature of science III	19 Dec 08	9:30 am - 4:30 pm		26
Training workshop of enhancing the teaching pedagogy of nature of science I	20 Dec 08	9:30 am - 4:30 pm		37
Training workshop of enhancing the teaching pedagogy of nature of science II	29 Dec 08	9:30 am - 4:30 pm		47
Training workshop of enhancing the teaching pedagogy of nature of science III	30 Dec 08	9:30 am - 4:30 pm		48
Planning meeting I	30 Jan 09	9:00 am - 1:00 pm		7
Planning meeting II	3 Feb 09	9:00 am - 1:00 pm		6
Planning meeting III	14 Feb 09	9:00 am - 1:00 pm		6

Facilitator meeting with participant teachers I	30 Mar 09	2:30 pm - 4:30 pm		4
Facilitator meeting with participant teachers II	18 Jun 09	10:00 am - 12:00 noon		4
Meeting on DVD design I (project team only)	28 Sep 09	2:15-5:15 pm		7
Meeting on DVD design II (project team only)	15 Mar 10	2:30-4:00 pm		8
Thematic workshop I (approach 1)	17 Apr 10	9:00 am-5:00 pm		13
Meeting on DVD design III (project team only)	13 May 10	10:00 am-12:30 noon		8
Thematic workshop II (approach 1)	15 May 10	9:00 am-5:00 pm		12
Meeting on DVD design IV (project team only)	8 Jun 10	3:00-5:30 pm		9
Thematic workshop III (approach 1 re-run)	19 Jul 10	9:00 am-1:00 pm		10
Thematic workshop IV (approach 1 re-run)	26 Jul 10	9:00 am-1:00 pm		8
Dissemination Seminar (two repeated sessions)	09 Oct 10	9:00 am -4:40 pm	Hui Oi Chow Science building, HKU	235
Trial lessons (Approach 1)	44 trial run lessons carried out by teachers in Approach 1(Refer to Appendix 9 for details)			
Post trial-run discussions (Approach 1)	44 discussions after each trial run lesson; each discussion last for 30 minutes to 1 hour. In some circumstances, the post-lesson discussion was done by phone.			
Study group meetings (Approach 1)	13 group study meetings for teachers in Approach 1(Refer to Appendix 10 for details)			
Preparatory meetings (Approach 2)	10 preparatory meetings for schools in Approach 2 for working out teaching schedules and design (Refer to Appendix 11 for details)			
Trial run lessons (Approach 2)	33 trial lessons carried out by teachers in Approach 2 (Refer to Appendix 12 for details)			
Mentor-mentee meetings (Approach 2)	44 Mentor-mentee meetings for teachers in Approach 2 (Refer to Appendix 13 for details)			
School-based workshops (Approach 2)	11 school-based workshops for teachers in Approach 2 (Refer to Appendix 14 for details)			

5. Difficulties encountered and solutions adopted

Due to personal reasons, a few teachers who initially joined Approach 1 withdrew from the project. One of the schools participated in approach 2 also dropped out. To sustain intensive small-group learning, three more teachers who expressed interest in the previous workshop on ideas about science were also invited to join Approach 1. Moreover, another school which had initially expressed interest in this project was re-invited to keep our participating schools in Approach 2 to three. For details, please refer to Appendix 15.

Because of various constraints such as timetable arrangement, curricular constraints and teachers' preference of topics they wanted to try out in their lessons, this had resulted in a narrower scope of topics covered than expected. In the end, only 13 study group meetings were conducted. The short fall of 9 study group meetings was compensated by 6 additional trial lessons and 2 additional thematic workshops in approach 1, and 5 more video-based workshops in approach 2.

In the last two years, there were some delays in our project due to: (1) changes in the number of participants in Approaches 1 and 2 as reported above; (2) delays of some trial lessons in schools because of school suspension for the sake of Swine flu outbreak in 2009; (3) the need to recruit new project manager and project assistant because the former staff left in Aug 2009. Therefore, we applied for an extension of the project by 3 months (Please refer to Appendix 16 for the revised schedule). The application was approved on 4 May 2010 (Please refer to Appendix 17 for the approval letter).

**The report should be signed by the supervisor of the school/the head of the organization or the one who signed the Quality Education Fund Agreement for allocation of grant on behalf of the organization.*

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Appendix 1 Evaluation questionnaire of teacher training workshops

Two-Day Training Workshop on
Preparing Teachers for Teaching Ideas about Science in the NSS Curriculum

Evaluation Questionnaire

To help us plan future workshops, please complete and return this questionnaire to us.

Part 1

Please put a "✓" in the appropriate box.

	Strongly agree 5	4	3	2	Strongly disagree 1
1. The objectives of the workshop were achieved.	❑	❑	❑	❑	❑
2. The content was relevant to the objectives of the workshop.	❑	❑	❑	❑	❑
3. The workshop has enriched my **knowledge** of teaching ideas about science.	❑	❑	❑	❑	❑
4. The workshop has enriched my **skills** of teaching ideas about science.	❑	❑	❑	❑	❑
5. The **strategies/ activities** suggested could be applied to my work.	❑	❑	❑	❑	❑
6. The **assessment schemes** suggested could be applied to my work.	❑	❑	❑	❑	❑
7. The tutors/facilitators were effective.	❑	❑	❑	❑	❑
8. The workshop has provided me the chance to share views and experience with other fellow teachers.	❑	❑	❑	❑	❑
9. The workshop was well organized.	❑	❑	❑	❑	❑
10. The classroom facilities were satisfactory.	❑	❑	❑	❑	❑
11. Overall, I was satisfied with the workshop.	❑	❑	❑	❑	❑

Please turn over the page

Part 2

1. Please indicate your views on the effectiveness of the workshop in enhancing (1) your understanding, and (2) your confidence in teaching ideas about science.

To what extent do you think each of the following areas of the workshop has been effective in enhancing your knowledge and confidence in teaching ideas about science?	**Gain in understanding/ knowledge**					**Gain in confidence**				
	A lot ◄——► None at all					**A lot ◄——► None at all**				
	5	**4**	**3**	**2**	**1**	**5**	**4**	**3**	**2**	**1**
i. Planning a lesson with an explicit focus on NOS/SI ideas	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
ii. Teaching NOS across a series of lessons	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
iii. Consolidating NOS learning	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
iv. Teaching ideas about science on unplanned occasions (critical incidents)	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
v. Teaching-learning strategies for STSE	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

2. Please state below the most impressive idea(s) about science you have learned in this workshop.

_____

_____

_____

3. Most useful activities/most impressive parts of this workshop:

_____

_____

_____

4. Other comments or suggestions:

_____

_____

In order to get more in-depth comments to improve our future teacher development activities, we will appreciate very much if you can have a 15-min telephone interview with us. Please provide us with the following information:

Name: Telephone number: Preferred time:

Thank you for your co-operation.

Appendix 2 Teachers' responses to Evaluation questionnaire of the teacher training workshops

Part 1

Items (strongly agree 5 – strongly disagree 1)	Mean	*SD
1. The objectives of the workshop were achieved.	4.17	0.70
2. The content was relevant to the objectives of the workshop.	4.19	0.72
3. The workshop has enriched my knowledge of teaching ideas about science.	4.16	0.72
4. The workshop has enriched my skills of teaching ideas about science.	4.10	0.50
5. The strategies/ activities suggested could be applied to my work.	4.03	0.72
6. The assessment schemes suggested could be applied to my work.	3.66	0.83
7. The tutors/facilitators were effective.	4.12	0.74
8. The workshop has provided me the chance to share views and experience with other fellow teachers.	4.06	0.72
9. The workshop was well organized.	4.00	0.82
10. The classroom facilities were satisfactory.	3.99	0.69
11. Overall, I was satisfied with the workshop.	4.09	0.67

* SD = standard deviation
N = 216

Part 2

To what extent do you think each of the following areas of the workshop has been effective in enhancing your knowledge and confidence in teaching ideas about science? (a lot 5 – none at all 1)	Mean	SD
1u. Planning a lesson with an explicit focus on NOS/SI ideas (gain in understanding)	4.05	0.86
1c. Planning a lesson with an explicit focus on NOS/SI ideas (gain in confidence)	3.82	0.96
2u. Teaching NOS across a series of lessons (gain in understanding)	3.93	0.94
2c. Teaching NOS across a series of lessons (gain in confidence)	3.77	0.96
3u. Consolidating NOS learning (gain in understanding)	3.95	0.93
3c. Consolidating NOS learning (gain in confidence)	3.82	0.94
4u. Teaching ideas about science on unplanned occasions (critical incidents) (gain in understanding)	3.73	0.97
4c. Teaching ideas about science on unplanned occasions (critical incidents) (gain in confidence)	3.76	1.32
5u. Teaching-learning strategies for STSE (gain in understanding)	3.96	1.10
5c. Teaching-learning strategies for STSE (gain in confidence)	3.80	1.25

N = 216

Part 3

Selected responses on the most impressive ideas about science learned in this workshop

- understanding of NOS, SI, STSE and modeling
- the ideas of teaching NOS across lessons, examples are given (videos on the teaching of nature of light)
- misconceptions about science
- the critical incidents; differences between science & technology
- making use of historical approach to teach NOS
- The introduction of teaching methods (argumentation; decision making framework; goal, right, responsibility frameworks for decision making) are the most impressive ideas.

Selected responses on the most useful activities/ most impressive parts of this workshop

- frameworks for STSE teaching
- all teaching videos, activities & PowerPoint, examples used to explain the teaching strategies
- list of Ideas about science help clarify the idea
- sharing of STSE activities e.g. transplant & kidney; CF light bulb; use of SARS timeline to bring the idea of NOS
- showing different videos clips from different teachers
- the design of assessments for NOS and SI
- decision-making: To experience the difficulties that Ss may encounter

Other comments or suggestions

- The workshop is well organized and useful.
- Day 1 was too long, it should be shortened to half day. Some Day 2 contents put to day 1.
- The duration of workshop is too long in one day. I think the content may divide into 3 days so it is easier for teachers to follow.
- how to deal with open-ended Q in NOS/SI/STSE while marks counted in examination (the reality)
- More lab works would be preferred

Appendix 3 Examples of teachers' written reflection after attending the meetings and workshops

After the study group meeting on "Evolution"

- Need to clarify the concepts that our student are going to learn;
- Should select the focus of a few NOS concepts to teach;
- Making use of students' ideas is very important in the process of teaching;
- Teachers have to clarify their own concepts before the lessons;
- Teachers should be ready to respond to students' answers;
- It is important to think about why teaching NOS is important in the new curriculum.

After the thematic workshops in approach I (subject-based approach)

- I have been using most of the skills illustrated in the workshop, but I am really stimulated to find that some teachers can use these skills to such an extent;
- It is useful to use statistics to summarize the ideas of students;
- It is important to use the explicit approach when asking students to do the investigation;
- To invite students to join the discussion can increase their ownership of their learning;
- We need to consider "science for all" or "science for scientist" when teaching ideas about science;

After the school-based workshops in approach II (school-based approach)

- We should not cover too many NOS ideas in one lesson;
- We should have more communication with colleagues and more collaboration among different subjects;
- Learn about the different understanding of hypotheses in different subjects;
- The same set of results can have different interpretations;
- The skills of responding to students' answer is important for successful teaching;
- The aim of teaching NOS is not just teaching terminology;
- Different social needs influence the development of science and technology;
- Need to encourage students to express their own ideas in the classroom;
- More time is needed for effective student discussion;
- There are different concepts of scientific investigations in different subjects.

Appendix 4 Evaluation Questionnaire of the dissemination seminar

Dissemination Seminar for
Preparing Teachers for Teaching Ideas about Science
in the New Senior Secondary Curriculum
A Dual Approach

「新高中新挑戰 – 以雙管方式培訓教授科學本質及相關課題的教學」
發佈會

Evaluation questionnaire

To help us plan future seminars, please complete and return this questionnaire to us.
請填寫本問卷並交回工作人員，以供將來舉辦發佈會參考之用。

Please put a "✓" in the appropriate box.
請在適當的格子內加上「✓」號。

	非常同意 Strongly agree 5	4	3	2	非常不同意 Strongly disagree 1
1. 發佈會的目標可以達到。 The objectives of the seminar were achieved.	❑	❑	❑	❑	❑
2. 發佈會內容切合主題。 The content was relevant to the subject area of the seminar.	❑	❑	❑	❑	❑
3. 所獲知識可應用在我的工作上。 The knowledge gained could be applied to my work.	❑	❑	❑	❑	❑
4. 發佈會安排妥善。 The seminar was well organized.	❑	❑	❑	❑	❑
5. 總括來說，我對這發佈會感到滿意。 Overall, I was satisfied with the seminar.	❑	❑	❑	❑	❑

其他意見或建議：
Other comments or suggestions:

_____

_____

_____

Thank you for your co-operation.
多謝合作。

Appendix 5 Teachers' responses to the Evaluation questionnaire of the dissemination seminar

Items (strongly agree 5 – strongly disagree 1)	Mean	*SD
1. The objectives of the seminar were achieved.	4.07	0.893
2. The content was relevant to the subject area of the seminar.	3.84	0.925
3. The knowledge gained could be applied to my work.	4.12	0.953
4. The seminar was well organized.	3.78	0.879
5. Overall, I was satisfied with the seminar.	3.94	0.937

*SD = standard deviation
N = 203

Appendix 6 Selected teachers' feedback on the project

About the trial lessons

- Discussion with project staff before trial lesson
- Lesson discussion and instruction package discussion. It was a pleasure to work with other colleagues for the good of our students.

About making use of videos in workshops

- Video record gives a good foundation for discussion and review
- Have a chance to be video recorded during trial lessons and to discuss the lessons with the project staff, as these can open my lessons for other practitioners to evaluate, comment and criticize. This promotes professional interactions and reflections.
- Have chance to look at video clips of other teachers' trial lessons, as this allows me to have a more concrete picture that shows how ideas about science can be taught and learnt in authentic contexts.
- Video taking and reflection. Critical assessment of teaching effectiveness

About meeting with other teachers in the workshops

- Meeting with other teachers in the project. Their critical suggestions help me to reflect on my own teaching. Not limited to teaching ideas about science, but also other skills of teaching.
- The detailed discussion in the study group meeting and the thematic workshop give me a lot of insight from other teachers' idea.
- Have chance to discuss and interact with other practitioners (teachers and project staff) about the video clips. These activities promote professional reflections and may increase confidence in teaching ideas about science.
- Discussion with different colleagues whom can give me new ideas about teaching of ideas about science and even other topics of biology. Critical reflection of the trial lesson among different colleagues can improve one's pedagogy very much.

Appendix 7 Arrangement of Dissemination Seminar

Dissemination Seminar

Preparing Teachers for Teaching Ideas about Science in the New Senior Secondary Curriculum - A Dual Approach

Project members: Dr. Benny Hin Wai Yung, Dr. Alice Siu Ling Wong, Dr. Jeffrey Day, Professor Derek Hodson, Mr. Maurice Man Wai Cheng, Mr. Ka Lok Wong, Dr. Valerie Wing Yan Yip, Mr. Kam Moon Ho, Ms. Sau Mei Tsui

Date:	9 October 2010 (Saturday)	
Time:	9:45 a.m. – 12:00 noon	2:00 p.m. – 4:15 p.m.
Venue:	LG 06, Hui Oi Chow Science Building, The University of Hong Kong	

(The two seminars are identical.)

Time	Programme
9: 45 – 10:00 a.m./ 2:00 – 2:15 p.m.	Registration
10:00 – 10:30 a.m./ 2:15 – 2:45 p.m.	Opening Speech Ms. Anna Oi Lan Lee, Chief Curriculum Development Officer (Science) of Curriculum Development Institute, Education Bureau
10:30 – 11:00 a.m./ 2:45 – 3:15 p.m.	Overview of the Project: Subject-based (Biology) Study Group Approach Dr. Benny Hin Wai Yung Overview of the Project: School-based Cross-disciplinary Approach Dr. Alice Siu Ling Wong Presentation of Certificates to Participant Teachers Ms. Anna Oi Lan Lee, Chief Curriculum Development Officer (Science) of Curriculum Development Institute, Education Bureau
11:00 – 11:30 a.m./ 3:15 – 3:45 p.m.	Experience and video sharing of exemplary I*ab*S Instruction (Subject-based approach) Dr. Benny Hin Wai Yung
11:30 – 12:00 noon/ 3:45 – 4:15 p.m.	Experience and video sharing of exemplary I*ab*S Instruction (School-based approach) Dr. Alice Siu Ling Wong & Mr. Maurice Man Wai Cheng

Appendix 8 Approval letter for making changes in budget

優質教育基金秘書處
QUALITY EDUCATION FUND SECRETARIAT

本會檔號 Our Ref.: EDB/QEF/2007/0195 SF
來函檔號 Your Ref.:

電話 Telephone: 2921 8347
傳真 Fax line: 2186 8183

28th September 2010

Dr Benny Hin Wai YUNG
Faculty of Education
The University of Hong Kong
Pokfulam Road
HONG KONG

Dear Dr Yung,

Preparing Teachers for Teaching about Science in the New Senior Curriculum: A Dual Approach (QEF Project No.: 2007/0195)

Thank you for your letter dated 2nd August 2010.

Please be informed that taking into consideration the justifications you have provided, approval is given for the following budget reallocation:

Budget Items	Approved Budget (a)	Revised Budget (b)	Virement (b) – (a)
Staffing Cost: Part-time research assistants	$33,250 [$95/hr for 350 hrs]	$73,250 [$95/hr for about 771 hrs]	+40,000
General Expenses for Office	$50,000	$80,000	+30,000
Staffing Cost: Part-time lecturers	$554,200 [$293 to $326/hr for 1700 hrs]	$504,200 [$293 to $326/hr for about 1546 hrs]	-50,000
Staffing Cost: Part-time investigators	$312,750 [$700/hr for about 447 hrs]	$302,750 [$709/hr for about 432 hrs]	-10,000
Equipment Costs and Laboratory Consumables	$49,500	$39,500	-10,000

If you have any queries, please feel free to contact me at 2921 8347.

Yours sincerely,

(Miss Maria LUK)
for Secretary
Quality Education Fund Steering Committee

香港灣仔皇后大道東 183 號合和中心 36 樓 3602 室
Room 3602, 36/F, Hopewell Centre
183 Queen's Road East, Wanchai, Hong Kong

Appendix 9 Trial lessons carried out by teachers in Approach 1

Date	Teacher	Time	Topic
4 Mar 09	Chan Pat Chun	9:50 am - 10:35 am	GM food 1
5 Mar 09	Chan Pat Chun	9:50 am - 10:35 am	GM food 2
5 Mar 09	Law Ming Wai	8:20 am - 9:05 am	GM food 1
6 Mar 09	Wong Chi Fai	8:20 am - 9:05 am	GM food 1
6 Mar 09	Law Ming Wai	1:30 pm - 2:15 pm	GM food 2
9 Mar 09	Chan Pat Chun	9:05 am - 10:35 am	GM food 3
9 Mar 09	Wong Chi Fai	9:05 am - 9:50 am	GM food 2
9 Mar 09	Law Ming Wai	11:00 am - 12:30 noon	GM food 3
12 Mar 09	Wong Chi Fai	11:00 am - 12:30 noon	GM food 3
25 Mar 09	Wan Oi Man	8:45 am - 10:15 am	Gastric ulcer
3 Apr 09	Leung Man Fai	2:00 pm - 3:20 pm	Predator prey relationship
9 Apr 09	Au Yeung Lai King	1:35 pm - 3:30 pm	Insulin
8 May 09	Chan Wing Man, Idy	8:35 am - 9:50 am	Polished rice
8 May 09	Lai Po Tak	2:30 pm - 3: 45 pm	Polished rice
15 May 09	Leung Ching Man	2:20 pm - 3: 50 pm	Gastric ulcer
19 May 09	Lam Pui Chow	9:40 am - 10:50 am	GM food 1
19 May 09	Lam Pui Chow	11:10 pm - 12:20 pm	GM food 2
21 May 09	Wong Ching Han	11:15 am - 12:25 noon	Evolution
21 May 09	Lam Pui Chow	1:50 pm - 2:25 pm	GM food 3
21 May 09	Lam Pui Chow	2:25 pm - 3:00 pm	GM food 4
22 May 09	Wan Oi Man	8:45 am - 10:15 am	Nucleus
25 May 09	Lam Pui Chow	9:40 am - 10:50 am	GM food 5
25 May 09	Lam Pui Chow	1:50 pm - 3:00 pm	GM food 6
25 May 09	Chau Wang Fai	1:35 pm - 3:30 pm	Nucleus
27 May 09	Lam Pui Chow	9:40 am - 10:50 am	GM food 7
28 May 09	Lam Pui Chow	11:00 am - 12:10 noon	GM food 8
29 May 09	So Wing Man	9:15 am - 10: 35 am	DNA
29 May 09	Tam Chun Kei, Stephen	2:25 pm - 3:45 pm	Evolution
29 Sep 09	Chan Pat Chun	1:30 - 3:40pm	DNA
30 Sep 09	Tong Ling Poon, Andrew	1:20 - 2:30pm	Catalase 1
6 Oct 09	Cheung Kwok On	10:20 - 11:05am	Nucleus
9 Oct 09	Tong Ling Poon, Andrew	10:55 - 12:20pm	Catalase 2
13 Oct 09	Law Ming Wai	11:00 - 12:30pm	Insulin
13 Oct 09	Tong Ling Poon, Andrew	1:20 - 2:30pm	Catalase 3
23 Oct 09	Chow King Yee	8:25 - 9:35am	Spontaneous Generation
30 Oct 09	Chow King Yee	2:50 - 4:00pm	Spontaneous Generation
5 Nov 09	Lam Lai Yung	8:55 - 10:10 am	Predator-prey relationship
24 Nov 09	Wong Wing Kei, Stephen	9:10 - 10:30am	Nucleus
8 Dec 09	Wong Chi Fai	9:00 - 10:20am	Polished rice

21-Apr-10	Au Yeung Lai King	2:05 -3:35 pm	Catalase
26-Apr-10	Li Chi Man	1:35 - 2:45 pm	Mendelian genetics
28-Apr-10	Au Yeng Lai King	2:05 - 3:35 pm	Catalase
19-Jul-10	Chan Wing man, Idy	9:20 am - 12:30 noon	Stomatal distribution
20-Jul-10	Chan Wing Man, Idy	9:20 am - 12:30 noon	Stomatal distribution

Appendix 10 Study group meetings for teachers joining Approach 1

Date	Time	Venue	Number of teacher participants	Topic
25 Jul 09	9:30 am - 12:30 pm	Runme Shaw Building, HKU	10	Polished or unpolished rice I
25 Jul 09	1:00 pm - 4:30 pm		9	Polished or unpolished rice II
7 Aug 09	9:30 am - 12:30 pm		14	GM food I
7 Aug 09	1:00 pm - 4:30 pm		12	GM food II
22 Aug 09	9:30 am - 12:30 pm		12	Nucleus I
22 Aug 09	1:00 pm - 4:30 pm		10	Nucleus II
31 Oct 09	1: 00 - 4:00 pm		9	Insulin
21 Nov 09	9:00 am - 12:00 noon		4	Catalase
21 Nov 09	1:00 pm - 4:00 pm		4	Spontaneous generation
23 Dec 09	9:30 am - 12:30 pm		11	DNA
20 Feb 10	1:30 - 4:30 pm		6	Gastric ulcer
20 Feb 10	9:30 am - 12:30 pm		9	Predator & prey
13 Mar 10	12:00 noon-5:00 pm		10	Evolution

Appendix 11 Preparatory meetings for schools joining Approach 2

Date	Time	Venue	Number of teacher participants
16 Oct 08	5:00 pm - 6:30 pm	Ho Yu College (sponsored by Sik Sik Yuen)	7
18 Oct 08	9:30 am - 11:30 am	St. Clare's Girls' School	7
21 Oct 08	4:30 pm - 6:30 pm	ECF Saint Too Canaan College	5
21 Mar 09	9:30 am - 1:00 pm	St Clare's Girls' School	11
8 Apr 09	9:30 am - 12:30 noon	ECF Saint Too Canaan College	9
8 Apr 09	2:00 pm - 5:00 pm	Ho Yu College (sponsored by Sik Sik Yuen)	10
9 Jun 09	9:00 am - 1:00 pm	St Clare's Girls' School	13
26 Jun 09	2:00 pm - 4:30 pm	Ho Yu College (sponsored by Sik Sik Yuen)	10
2 Jul 09	2:00 pm - 5:30 pm	Assembly of God Hebron Secondary School	11
27 Aug 09	9:00 am - 11:00 am	Assembly of God Hebron Secondary School	11

Appendix 12 Trial lessons carried out by teachers in Approach 2

Date	Topic	School	Teacher	Subject	Time	Grade
11 Sep 09	Cell	Ho Yu College (sponsored by Sik Sik Yuen)	Lui Siu Kee	Bio	1:50 - 3:40 pm	F4
11 Sep 09	Atomic Structure	Ho Yu College (sponsored by Sik Sik Yuen)	Lo Yin Fong	Chem	1:50 - 3:40 pm	F4
16 Sep 09	Cell membrane	Ho Yu College (sponsored by Sik Sik Yuen)	Lui Siu Kee	Bio	12:00 - 12:50pm	F4
16 Sep 09	Periodic table	Ho Yu College (sponsored by Sik Sik Yuen)	Lo Yin Fong	Chem	12:00 - 12:50pm	F4
21 Sep 09	Atom theory	St Clare's Girls' School	Fung Chi Kin	Chem	10:15 - 10:55am	F4
22 Sep 09	Microscope	Assembly of God Hebron Secondary School	Wong Po Ling	Bio	12:10 - 12:50pm	F3
22 Sep 09	Sports and technology	Assembly of God Hebron Secondary School	Choi Wai Ting	Phy	10:40 - 11:30	F4
22 Sep 09	Sports and technology	Assembly of God Hebron Secondary School	Leung Kai Yu	Phy	3:10 - 4:00pm	F4
05 Oct 09	Cell membrane	St Clare's Girls' School	Li Siu Tak	Bio	2:35-3:55pm	F3
05 Oct 09	Cell membrane	St Clare's Girls' School	Tam Siu Man	Bio	2:35-3:55pm	F4
05 Oct 09	Microscope	Assembly of God Hebron Secondary School	Chan Kwan Ling	Bio	2:50 - 3:40pm	F4
07 Oct 09	Cell membrane	St Clare's Girls' School	Li Siu Tak	Bio	2:35-3:55pm	F3
07 Oct 09	Cell membrane	St Clare's Girls' School	Tam Siu Man	Bio	2:35-3:55pm	F4
08 Oct 09	Microscope	Assembly of God Hebron Secondary School	Chan Kwan Ling	Bio	2:50 - 3:40	F4
14 Oct 09	Chromosome	Ho Yu College (sponsored by Sik Sik Yuen)	Lui Siu Kee	Bio	12:00 - 12:50pm	F4
04 Nov 09	Endosymbiosis	Assembly of God Hebron Secondary School	Wong Po Ling	Bio	2:50 - 3:40pm	F4
09 Nov 09	Latent heat	St Clare's Girls' School	Cheung Wing Chi	Phy	10:15 - 10:55am	F3
24 Nov 09	Inertia	St Clare's Girls' School	Kwan Wing Tak	Phy	10:15 - 10:55am	F4
26 Nov 09	Food pyramid	St Clare's Girls' School	Tam Siu Man	Bio	10:15 - 10:55am	F4
02 Dec 09	Biological washing powder	St Clare's Girls' School	Li Siu Tak	Bio.	2:35-3:55pm	F4
17 Dec 09	Different means of assessing obesity	St Clare's Girls' School	Tam Siu Man	Bio	10:15 - 10:55am	F4
17 Dec 09	AIDS	St Clare's Girls' School	Li Siu Tak	LS	8:45 - 10:15	F4
03 Feb 10	Mole	Ho Yu College (sponsored by Sik Sik Yuen)	Lo Yin Fong	Chem	12:00 - 12:50pm	F4
05 Feb 10	Mole	Ho Yu College (sponsored by Sik Sik Yuen)	Lo Yin Fong	Chem	1:50 - 3:40 pm	F4
10 Feb 10	Mole	Ho Yu College (sponsored by Sik Sik Yuen)	Lo Yin Fong	Chem	1:50 - 3:40 pm	F4
8 Mar 10	Digestive system	St Clare's Girls' School	Li Siu Tak	Bio	10:30-11:30	F4
10 Mar 10	AIDS	St Clare's Girls' School	Cheung Wing Chi	Bio	10:30-11:30	F4
11 Mar 10	Momentum	Ho Yu College	Tang Ka Ho	Phy	09:00-09:55	F4

		(sponsored by Sik Sik Yuen)				
15 Mar 10	Digestive system	St Clare's Girls' School	Li Siu Tak	Bio	14:30-16:00	F4
29 Mar 10	Digestive system	St Clare's Girls' School	Li Siu Tak	Bio	14:30-16:00	F4
29 Mar 10	Drug	Ho Yu College (sponsored by Sik Sik Yuen)	Wong Po Ling	Chem	11:00-11:45	F4
9 Apr 10	Bonding	Assembly of God Hebron Secondary School	Lai Yu Ying	Chem	12:00-13:01	F4
19 Apr 10	Enzyme	St Clare's Girls' School	Li Siu Tak	Bio	14:30-16:00	F4

Appendix 13 mentor-mentee meetings for teachers joining Approach 2

Date	Venue	Subjects	Time
2 Apr 09	Runme Shaw Building, HKU	Chem	12:00 noon – 4:30 pm
20 Apr 09	Runme Shaw Building, HKU	Chem	8:30 am – 10:00 am
4 Aug 09	St Clare's Girls' School	Bio	9:00 am – 12:30 noon
14 Aug 09	Runme Shaw Building, HKU	Phy	2:00 – 3:30 pm
21 Aug 09	Runme Shaw Building, HKU	Phy	2:00 – 3:30 pm
24 Aug 09	Ho Yu College (sponsored by Sik Sik Yuen)	Bio	2:00 pm – 4:30 pm
11 Sep 09	Ho Yu College (sponsored by Sik Sik Yuen)	Bio	3:40- 4:25 pm
11 Sep 09 – by phone (Ho Yu College --sponsored by Sik Sik Yuen))		Chem	9:20- 10:15 pm
16 Sep 09	Ho Yu College (sponsored by Sik Sik Yuen)	Bio	12:50- 1:20 pm
22 Sep 09	Assembly of God Hebron Secondary School	Bio	12:00- 01:35 pm
22 Sep 09	Assembly of God Hebron Secondary School	Phy	12:30- 1:20 pm
22 Sep 09	Assembly of God Hebron Secondary School	Phy	4:00- 4:50pm
5 Oct 09	Assembly of God Hebron Secondary School	Bio	3:55- 4:40 pm
5 Oct 09	St Clare's Girls' School	Bio	3:55- 4:20 pm
14 Oct 09	Ho Yu College (sponsored by Sik Sik Yuen)	Bio	12:50- 1:20 pm
14 Oct 09 – by phone (Assembly of God Hebron Secondary School)		Chem	9:00- 10:30 pm
4 Nov 09	Assembly of God Hebron Secondary School	Bio	3:40- 4:20 pm
4 Dec 09 – by phone (Assembly of God Hebron Secondary School)		Chem	10:00- 10:50 pm
5 Jan 10 – by phone (St Clare's Girls' School)		Phy	9:00- 10:30 pm
16 Jan 10 By Phone (Ho Yu College - sponsored by Sik Sik Yuen)		Chem	9:20- 10:15 pm
18 Jan 10	Ho Yu College (sponsored by Sik Sik Yuen)	Chem	3:40- 4:20 pm
18 Jan 10 – by phone (St Clare's Girls' School)		Phy	9:20- 10:40 pm
4 Feb 10	Ho Yu College (sponsored by Sik Sik Yuen)	Phy	3:30- 4:50 pm
5 Feb 10	Assembly of God Hebron Secondary School	Phy	2:00- 4:00 pm
9 Feb 10 – by phone (Ho Yu College - sponsored by Sik Sik Yuen)		Chem	10:00- 11:30 pm
10 Feb 10 – by phone (St Clare's Girls' School)		Phy	9:00- 9:40 pm
13 Feb 10	Assembly of God Hebron Secondary School	Bio	5:15- 6:30 pm
13 Feb 10	Assembly of God Hebron Secondary School	Phy	5:15- 6:30 pm
13 Feb 10	Assembly of God Hebron Secondary School	Chem	5:15- 6:30 pm
15 Feb 10	Ho Yu College (sponsored by Sik Sik Yuen)	Bio	5:15- 6:30 pm
15 Feb 10	Ho Yu College (sponsored by Sik Sik Yuen)	Phy	5:15- 6:30 pm
15 Feb 10	Ho Yu College (sponsored by Sik Sik Yuen)	Chem	5:15- 6:30 pm
8 Mar 10	St Clare's Girls' School	Bio	11:30 am-12:30 noon
10 Mar 10	St Clare's Girls' School	Bio	11:30 am-12:20 noon
11 Mar 10	Ho Yu College (sponsored by Sik Sik Yuen)	Phy	9:00-9:55 pm
15 Mar 10	St Clare's Girls' School	Bio	4:15-5:05 pm
29 Mar 10	Phone (Assembly of God Hebron Secondary School)	Chem	9:00-9:55 pm

29 Mar 10	St Clare's Girls' School	Bio	4:05-4:45 pm
19 Apr 10	St Clare's Girls' School	Bio	4:10-5:00 pm
17 May 10	Assembly of God Hebron Secondary School	Phy	4:00-5:30 pm
27 May 10	Assembly of God Hebron Secondary School	Bio	1:00-1:40 pm
28 May 10	Ho Yu College (sponsored by Sik Sik Yuen)	Phy	4:00-6:00 pm
31 May 10	Assembly of God Hebron Secondary School	Phy	2:30-4:30 pm
5 Jul 10	Ho Yu College (sponsored by Sik Sik Yuen)	Phy	5:00-6:00 pm

Appendix 14 School-based workshops for teachers joining Approach 2

Date	Time	Venue	Number of participants
28 Nov 08	9:30 am – 4:30 pm	Ho Yu College (sponsored by Sik Sik Yuen)	7
9 Nov 09	3:45- 5:15 pm	Assembly of God Hebron Secondary School	4
8 Jan 10	2:00-5:00 pm	St Clare's Girls' School	12
13 Jan 10	2:00-5:00 pm	Assembly of God Hebron Secondary School	8
15 Jan 10	2:00-5:00 pm	Ho Yu College (sponsored by Sik Sik Yuen)	5
15 Feb 10	2:00-5:00 pm	Ho Yu College (sponsored by Sik Sik Yuen)	11
25 Feb 10	4:00-6:00 pm	St Clare's Girls' School	6
5 Mar10	4:00-6:00 pm	St Clare's Girls' School	13
15 Jun 10	10:00 am – 1:00 pm	St Clare's Girls' School	
22 Jun 10	2:00-4:00 pm	Assembly of God Hebron Secondary School	8
5 Jul 10	2:00-5:00 pm	Ho Yu College (sponsored by Sik Sik Yuen)	10

Appendix 15 Change in participants of Approaches 1 and 2

Approach 1		
Participant	**School Name**	**Remarks**
Group 1		
Mr Chan Pat Chun	QES Old Students' Association Secondary School	
Ms Law Ming Wai	QES Old Students' Association Secondary School	
Mr Lam Pui Chow	Carmel Secondary School	
Mr Wong Chi Fai	QES Old Students' Association Secondary School	
Ms Au Yeung Lai King	GCC&ITKD Lau Pak Lok Secondary School	
Mr Li Chi Man	YLPMSAA Tang Siu Tong Secondary School	
Ms So Wing Man	Confucius Hall Middle School	
Mr Wu Yiu Hung	Ju Ching Chu Secondary School (Yuen Long)	
Group 2		
Miss Chan Wing Man	Fanling Rhenish Church Secondary School	
Mr Lai Bo Tak	Fanling Rhenish Church Secondary School	
Mr Leung Man Fai	St. Francis Xavier's College	dropped out; teacher seconded to EDB
Mr Stephen Tam	Christian Alliance College	
Miss Wong Ching Han	Kau Yau College	dropped out; health problem
Miss Hui Wai Man	Ling Liang Church M H Lau Secondary School	dropped out; worked in another school
Group 3		
Mr Tong Ling Pun, Andrew	Cheung Chuk Shan College	
Mr Chau Wang Fai	Yu Chun Keung Memorial College	
Mr Cheung Kwok On	St. Margaret's Co-educational English Sec & Pri School	
Ms Chow King Yee	True Light Girls' College	
Ms Wan Oi Man	Tseung Kwan O Government Secondary School	
Ms Lam Lai Yung,	St. Stephen's Girls' College	
Ms Wong Yee Man	ECF Saint Too Canaan College	new participant
Ms Leung Ching Man	ECF Saint Too Canaan College	new participant
Mr. Wong Wing Kei, Stephen	China Holiness Church Living Spirit College	new participant

Approach 2	
School	**Remarks**
Ho Yu College (sponsored by Sik Sik Yuen)	
St. Clare's Girls College	
ECF Saint Too Canaan College	dropped out; personnel change
Assembly of God Hebron Secondary School	new participating school

Appendix 16 Extension of the project and changes in the schedule

<table>
<tr><th colspan="2">Stage of Implementation</th><th>Proposed Schedule</th><th>Revised Schedule</th></tr>
<tr><th>Approach 1 - Biology Study Groups</th><th>Approach 2 - School-based</th><th></th><th></th></tr>
<tr><td colspan="2">1. Recruiting project staff, setting up project office, publicizing project and inviting teachers and schools to participate</td><td>09/2008 - 10/2008</td><td>09/2008 - 10/2008</td></tr>
<tr><td colspan="2">2. 3 workshops (40 teachers each) for consolidation of knowledge on ideas about science</td><td>12/2008</td><td>12/2008</td></tr>
<tr><td colspan="2">3. 3 workshops (40 teachers each) on design of learning and teaching activities for learning ideas about science</td><td>12/2008</td><td>12/2008</td></tr>
<tr><td>4. Setting up 3 Study Groups, each with their specific agenda, e.g. which topics to work on, schedule and venue of meeting.</td><td rowspan="4">Main phase - Planning
Three half-yearly planning meetings with each participating school (at least 3 schools) to work out their specific agenda (e.g. teaching schedule of targeted ideas about science, schedule of professional development workshops on pedagogical skills, etc.).

Main phase - Mentorship to ownership
Conduct mentor-mentee meetings for each school to guide and facilitate teachers in development and refinement of appropriate learning and teaching activities.

Main phase - Workshop on effective teaching of ideas about science
Conduct at least 2 professional development video-based workshops per school.</td><td>Approach 1: 11/2008</td><td>Approach 1: 11/2008</td></tr>
<tr><td rowspan="2">5. Individual Study Group Meetings and Trial Run Lessons in schools</td><td>Approach 1: 12/2008 - 09/ 09</td><td>Approach 1: 12/2008- 07/10</td></tr>
<tr><td>Approach 2: 12/2008 - 09/ 09</td><td>Approach 2: 12/2008- 07/10</td></tr>
<tr><td>6. First Thematic Workshop on effective teaching of ideas about science (re-run in 06/10)</td><td>Approach 1: 12/ 09</td><td>Approach 1: 04/10</td></tr>
<tr><td>7. Second Thematic Workshop on effective teaching of ideas about science (re-run in 06/10)</td><td>Approach 1: 02/10</td><td>Approach 1: 05/10</td></tr>
<tr><td colspan="2">8. Production of 6 DVDs on "Learning to Teach Ideas about Science"</td><td>02/10- 06/10</td><td>06/10- 09/10</td></tr>
<tr><td colspan="2">9. One-day conference disseminating the outcomes of the project</td><td>07/10</td><td>10/10</td></tr>
<tr><td colspan="2">10. Writing up reports and presentation of results</td><td>08/10</td><td>11/10</td></tr>
</table>

Appendix 17 Approval letter of extension of the project

[illegible]