**THE CHINESE UNIVERSITY OF HONG KONG**

**Micro-Module Courseware Development Grant**

**Final Report (December 2015)**

Report due 31 December 2015.
Please return by email to The Ad hoc Committee on Planning of eLearning Infrastructure
mmcd@cuhk.edu.hk

PART I

Project title: Supplementary courseware for non-science students studying UGFN1000
Principal supervisor: Kai Ming KIANG
Co-supervisor(s): Andy Ka Leung NG, Derek Hang Cheong CHEUNG, Vivian Jun WU
Department / Unit: Office of University General Education
Project duration: From January 2015 to December 2015 (extended from August)
Date report submitted: 24 December 2015

## 1. Project objectives

*Is the project on track to meet its objectives?*
*Have the objectives been changed as a result of the experience of working on your MMCDG project?*

The Project is on track and completed. It has met its objectives of providing additional help to non-science students in studying UGFN1000. Even more, with the extension of the grant approved, the project has extended to include recording lectures in three languages, namely Cantonese, Mandarin and English, for each of the micro-modules. This allowed all students in CUHK, including local, mainland and international students to benefit from this work.

## 2. Process, outcomes or deliverables

*Please specify the number of micro modules produced, and the course(s) (with course codes and titles) that have used the micro modules in Part IV, and provide more detailed descriptions in here.*
*Have the nature of the deliverables been changed?*
*Have you adjusted your timeline?*
*Overall, was the project completed satisfactorily?*

There are 3 micro-modules produced (each consisting of a series of sub sections). The micro-modules are developed for the course UGFN1000 In Dialogue with Nature.
As mentioned in part 1, the deliverables have increased to include the three languages, from just one in the original proposal. The grant was approved to extend from ending in August

2015 to December 2015 to incorporate such expansion of the scope. We consider the project as completed satisfactorily.

## 3. Evaluation Plan

*Have you altered your evaluation plans?*
*What monitoring data did you collect?*
*Does your evaluation indicate that you have achieved your objectives?*

The evaluation plan has not been altered. Two student surveys were used on students studying UGFN in 2014-15 Term 2 and 2015-16 Term 1. Some data are provided below. The data suggested that we have achieved our objectives of helping non-science students in studying UGFN.

Usage of the micro-modules in 2015/16 Term 1:

- Live lecture: 70/442 (15.8%)
- Website: 140/442 (31.7%)

This roughly matches our expectation of the ratio of non-science students in the classes.

Classes with vs without supplementary set in 2014/15 Term 2:

| | Exit minus Entry | | |
|---|---|---|---|
| | With supp set (%) | Without supp set (%) | Diff (%) |
| 1. I can analyze and evaluate arguments critically. | 39.0 | 43.7 | -4.7 |
| 2. I am open to new and different ideas. | 36.6 | 18.3 | 18.3 |
| 3. I can articulate clearly my ideas in writing. | 22.0 | 25.5 | -3.5 |
| 4. I can express clearly my ideas orally. | 17.0 | 21.9 | -4.9 |
| 5. I am confident in reading difficult texts in English. | 19.5 | 11.7 | 7.8 |
| 6. I am confident in reading science-related texts. | 26.9 | 10.9 | 16.0 |
| 7. I am interested in natural science. | 26.7 | 14.6 | 12.1 |
| 8. Scientific knowledge is important for my intellectual development. | 26.9 | 13.2 | 13.7 |
| 9. I understand the development of natural science. | 56.1 | 42.4 | 13.7 |
| 10. I understand various features of scientific methods. | 53.7 | 37.9 | 15.8 |
| 11. I understand the contributions and limitations of scientific inquiry. | 53.7 | 43.8 | 9.9 |
| 12. I can assess the social implications of scientific inquiry. | 43.9 | 50.4 | -6.5 |

Science vs Non-science students in academic performance in 2014/15 Term 2:

| Classes | Number of non-science students * | Number of non-science students getting B- or below (Percentage) |
|---|---|---|
| WITHOUT supplementary set | 81 | 22 (27.2 %) |
| WITH supplementary set | 45 | 8 (17.8 %) |

For more details of the data, please refer to our presentation in the Teaching and Learning Innovation Expo 2015, titled "Micro-module Courseware Development: Supplementing Non-science Students in Reading Science-related Classics".

**4. Dissemination, diffusion and impact**

*Please provide examples of dissemination: website, presentations in workshops or conferences, or publications.*
*Please provide examples of diffusion: how the project results/process/outcomes/deliverables being used in your unit and other parts of CUHK or other institutions?*
*Please provide examples of impact: how the project results (micro modules) can be adapted to other disciplines.*

The micro-module website, which includes all the deliverables:
http://www.cuhk.edu.hk/eLearning/c_tnl/mmcd/showcase/2015_23.html

A journal paper, titled "Teaching Science to Non-Science Students with Science Classics", based on the analysis of the work produced by this grant has been published on the American Journal of Educational Research, Vol. 3, No. 10, 2015, pp 1291-1297.
http://pubs.sciepub.com/education/3/10/13/index.html

A presentation, titled "Teaching Science to Non-Science Students with Science Classics", is presented in the Lilly International Conference 2015, Bethesda, MD - May 28-31.
http://media.wix.com/ugd/7516e7_4f585e78dc064a3bb3a5f3976e7ff01f.pdf

A presentation and a poster, titled "Micro-module Courseware Development: Supplementing Non-science Students in Reading Science-related Classics" are presented in the Teaching and Learning Innovation Expo 2015, CUHK at 16 December.
http://www.cuhk.edu.hk/eLearning/expo/programme.html

The micro-modules developed by this team of 4 UGFN lecturers, are now used by 10 UGFN lecturers. This almost covers 2/3 of all UGFN lecturers. The evaluation model used in this project can certainly be used in similar micro-modules projects.

PART II

Financial data

Funds available:

Funds awarded from MMCDG $ 94000

Funds secured from other sources $ 0

(please specify_____)

Total: $ 94000

Expenditure:

| Item | Budget as per application | Expenditure | Balance |
|---|---|---|---|
| Student helper | $24000 | $31220 | -$7220 |
| Part-time RA | $76000 | $61126.99 | $14873.01 |
| Misc. | | $121 | -$121 |
| | | | |
| Total (bid): | $100000 | | |
| Total (approved): | $94000 | $93736.99 | $1532.01 |

PART III

Lessons learnt from the project

*Please describe your way forward.*

The team has applied for MMCDG 2015 for developing a separate set of micro-modules for UGFN.

*Please describe any of the following item(s) accordingly:*

- *Key success factors, if any*
- *Difficulties encountered and remedial actions taken, if any*
- *The role of other units in providing support, if any*
- *Suggestions to CUHK, if any*
    - *Example: what should be done differently?*

This project has involved the use of many student helpers. This helps the project to minimize the cost as well as generating contents that are deemed to be appropriate for the students to use. They however are difficult to be managed (both time and quality). ITSC also offered some valuable help in setting up the MMC website.

Another key success factor for this project is the detailed evaluation method. We have spent

great effort in producing the entry-exit surveys, conducting it, and then analyzing it. This effort has resulted as a valuable feedback on the effectiveness of the deliverables of this project.

PART IV
Information for public access

*Summary information and brief write-ups of individual projects will be uploaded to a publicly accessible CUHK MMCDG website. Please extract from Part I the relevant information to facilitate the compilation of the publicly accessible website and reports.*

**1. Keywords**

*Please provide five keywords (in the order of most relevant to your project to least relevant) to describe your micro-modules/pedagogies adopted.*

(Most relevant) Keyword 1: science education

Keyword 2: general education

Keyword 3: classic texts

Keyword 4: assessments

(Least relevant) Keyword 5: learning outcome

**2. Summary**

*Please provide information, if any, in the following tables, and provide the details in Part I.*

| **Table 1: Publicly accessible online resources (if any)** |
|---|
| (a) **Project website:**<br>*If a publicly accessible project website has been constructed, please provide the URL.*<br>http://www.cuhk.edu.hk/eLearning/c_tnl/mmcd/showcase/2015_23.html |
| (b) **Webpage(s):**<br>*If information of your project is summarized in a webpage (say a page in the department's or faculty's website), please provide the URL(s) in here.* |
| (c) **Others (please specify):** |

| **Table 2: Resource accessible to a target group of students (if any)** |
|---|
| *If resources (eg. software) have been developed for a target group of students (eg. in a course, in a department) to gain access through specific platforms (eg. Blackboard, facebook), please specify.* |

| **Course Code/ Target Students** | **Term & Year of offering** | **Approximate No. of students** | **Platform** |
|---|---|---|---|
| *UGFN1000* | *1st term 2015* | *150* | *Blackboard* |
| | | | |

| **Table 3: Presentation (if any)** | |
|---|---|
| *Please classify each of the (oral/poster) presentations into one and only one of the following categories* | **Number** |
| (a) In workshop/retreat within your unit (eg. department, faculty) | *0* |
| (b) In workshop/retreat organized for CUHK teachers (eg. CLEAR workshop, workshop organized by other CUHK units) | *0* |
| (c) In CUHK ExPo jointly organized by CLEAR and ITSC | *1* |
| (d) In any other event held in HK (eg. UGC symposium, talks delivered to units of other institutions) | *0* |
| (e) In international conference | *1* |
| (f) Others (please specify) | *0* |

| **Table 4: Publication (if any)** | |
|---|---|
| *Please classify each piece of publications into one and only one of the following categories* | **Number** |
| (a) Project CD/DVD | *0* |
| (b) Project leaflet | *0* |
| (c) Project booklet | *0* |
| (d) A section/chapter in a booklet/ book distributed to a limited group of audience | *0* |
| (e) Conference proceeding | *0* |
| (f) A chapter in a book accessible internationally | *0* |
| (g) A paper in an referred journal | *1* |
| (h) Others (please specify) | *0* |

### 3. A one-page brief write up

*Please provide a one-page brief write-up of no more than 500 words or a short video (~2 minutes) (preferred).*

The course In Dialogue with Nature is a course of the General Education Foundation (GEF) programme in the Chinese University of Hong Kong (CUHK). As a course specially designed for the four-year curriculum, beginning from 2012, it becomes compulsory for all approximately 4000 students intake per year. Through reading science-related classics, students can discuss the core questions brought up by the classics and how these are put in modern context.

While the course has received generally positive feedback from the students, it is of concern that, however, students without high school science background were seemingly underperforming. Moreover, while it was deemed that the main aim of this course was to enhance student's understanding and appreciation of the nature of science and therefore the student's previous science education is unnecessary, students might not all agree to this assertion. For this reason, an attempt has been made to supplement this particular group of students. Three sets of micro-modules explaining basic scientific knowledge in a way that is tailor-made for In Dialogue with Nature have been produced. While high school science classes usually focus on calculations and memorizing formulas and equations, these micro-modules focused on introducing modern explanations of nature and how these are different from the historical explanations. By illustrating these explanations with lively examples, non-science students can quickly understand the competing explanations. They could then assess the pros and cons of these explanations through which they can practise their critical thinking skills. Ultimately, they could gain confidence and interest in further exploring more in the nature of science.

These micro-modules, which are non-credit bearing and optional, could unavoidably be brief in comparison to standard science courses. Hence, interested students would often have a desire to think through the concepts repeatedly and verify their own understanding. For this reason, the micro-modules included both the recorded lectures and a series of online exercises. The micro-modules allowed the students to work on the supplementary materials at their own time and at their own pace.

Analysis has been conducted to measure the effectiveness of the micro-modules. The effectiveness is mainly measured by student surveys supported by students' academic performance. The preliminary analyzed results indicated that the micro-modules can significantly enhance non-student's interest and understanding on natural science. Meanwhile, there is a significant increment on confidence in reading science text and an improvement in the academic performance of the non-science students after the implementation of the micro-modules.