THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Scheme 1: Basic Scheme

<u>Final Report (2017-18)</u>

Report due 31 October 2018

Please return by email to The Ad hoc Committee on Planning of eLearning Infrastructure <u>mmcd@cuhk.edu.hk</u>

<u>PART I</u>

Project title: Development of Virtual Labs on Frontiers in Biochemistry

Principal supervisor: Prof. Au Wing Ngor Shannon

Co-supervisor(s): Prof. Shaw Pang Chui and Mr. Kenneth Leung

Department / Unit: School of Life Sciences

Project duration: From December 2017 to October 2018

Date report submitted: 31 October 2018

1. Project objectives

The project is on track and meet the initial objectives. We have developed one micro-module with four virtual laboratories, each focuses on a frontier topic in biochemistry.

2. Process, outcomes or deliverables

One micro-module is produced and it will mainly be used for an undergraduate course BCHE2000 Frontiers in Biochemistry. The micro-module consists of four virtual laboratories covering topics on RNA biology, Stem cells, Cancer and Metabolic diseases. For each topic, the duration of on-line interactive learning is about 20-30 minutes. This includes background information, timelines for major discoveries, virtual laboratory and a short self-test. Since the teaching materials can also be adopted for other junior year courses, we will also open this elearn platform to the first and second year life sciences courses, e.g. LSCI1002, BIOL2120.

Overall, the nature of the deliverables has not been changed. However, the timeline was tight and we just managed to complete the construction of the website. Though further polishing is needed, in general the project was completed satisfactorily.

3. Evaluation Plan

We haven't altered our evaluation plans. Since the micro-module was available for review in mid-late Oct, we just started the evaluation process. Currently we have collected comments

from 7 senior year students. More feedback is expected to be received in the coming weeks. It may be too early to conclude we have achieved our objective, but from our preliminary data, all 7 students agree that a) the contents of the micro-module are clear and easy to follow, b) the animations can demonstrate the key concepts/techniques/mechanisms of the said topic and c) the graphic design is good.   6 out of 7 students agree that a) the platform is user friendly and b) will be helpful for flipped classroom activity. Additional free comments on how to improve the layout and content of the timelines for major discoveries are also received. We will work with the ITSC service team to polish the website before the release of the micro-module in the 2nd Term 2018/2019. Collection of feedback from the current BCHE2000 students and teachers will be followed up.

4. Dissemination, diffusion and impact

We have created a web site: https://www.cuhk.edu.hk/culive/vlab_2018 *and will give a poster presentation to share our work in EXPO2018 this December.*

Our micro-module will be released and used for an undergraduate course BCHE2000 Frontiers in Biochemistry in the second term. It is a required course for all Biochemistry major students. The class size is about 50. We also plan to make this platform available to year 1 and year 2 life science students so that they can gain some knowledge and technical skills in biochemistry.

PART II

Financial data

Funds available:

Funds awarded from MMCDG	$ 100,000.00
Funds secured from other sources (please specify: Support received from Biochemistry Programme)	$ 26,223.12
Total:	$ 126,223.12

Expenditure:

Item	Budget as per application	Expenditure	Balance
Part-time Research Assistant and Student Helpers	$ 60,000.00	$ 73,884.38	$ (13,884.38)
Service from ITSC	$ 40,000.00	$ 40,000.00	$ 0.00
Total:	$100,000.00		$ (13,884.38)

Lessons learnt from the project

This project involved the participation of 1 part-time research assistant and 10 undergraduate student helpers who have taken BCHE2000 before. The students worked in teams and each team focused on one specific topic. They also interviewed the respective teachers for the content design to ensure the micro-module is well aligned with the course content. We consider having the senior year students to join the project is one of the key success factors as the elearn platform becomes more student-oriented and the content fully integrates their learning experience. However, we also encountered difficulties when there is a need to call for a joint meeting to discuss the progress. Different degrees of delay also happened when the students were engaged in their mid-term/final exams and summer vacation. Instead of having joint group meetings, we switched to use Whatsapp and emails to communicate with the students at the later stage of the project. Nevertheless, with the assistance from the part-time RA to coordinate and compile the work submitted by the student helpers, and the technical support from ITSC, our micro-module was finally completed in Oct. We will continue our evaluation process and fine-tune our website before it is released in Jan 2019.

PART IV

Information for public access

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: Biochemistry

                   Keyword 2: Virtual laboratory

                   Keyword 3: Flipped classroom

                   Keyword 4:

(Least relevant)   Keyword 5:

2. Summary

Please provide information, if any, in the following tables, <u>and provide the details in Part I</u>.

Table 1: Publicly accessible online resources (if any)
(a) **Project website:**

https://www.cuhk.edu.hk/culive/vlab_2018

(b) Webpage(s):

N/A

(c) Tools / Services:

Service from ITSC (Creation of website, website design and development, production of interactive major events and animations)

(d) Pedagogical Uses:

Our platform will provide a tool to enhance students' ability in self-learning especially the logic of experimental design and analysis on various key topics in biochemistry. In-class time can then be reserved for higher-ordered student-centered learning activities for example: forum/discussion on a scientific issue that will stimulate students' capacity in innovation and design, and their social awareness.

(c) Others (please specify):

Table 2: Resources accessible to a target group of students (if any)

If resources (e.g. software) have been developed for a target group of students (e.g. in a course, in a department) to gain access through specific platforms (e.g. Blackboard, facebook), please specify.

Course Code/ Target Students	Term & Year of offering	Approximate No. of students	Platform
BCHE2000	*2nd term (2018/ 2019)*	*50*	*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 (e.g. department, faculty)	-
(b) In workshop/retreat organized for CUHK teachers (e.g. CLEAR workshop, workshop organized by other CUHK units)	-
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	*1 (EXPO 2018)*
(d) In any other event held in HK (e.g. UGC symposium, talks delivered to units of other institutions)	-
(e) In international conference	-
(f) Others (please specify)	-

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

3. A one-page brief write up

Please provide a one-page brief write-up of no more than 500 words and a short video.

Science education requires both understanding of principles and hands-on experience of the technical know-how that prompt students to apply the knowledge and logics to generate new scientific ideas. However, it is often a challenge to offer a laboratory course for classes with large number of students. This can be exemplified by the first year study in the broad-based science programme. BCHE2000 Frontiers in Biochemistry is an undergraduate course required for Biochemistry students. The course introduces different advanced topics in biochemistry. To facilitate the teaching effectiveness of the course, this MMCD project aims to develop a self-learning channel for students to grab the key concepts and research skills on 4 specific topics - RNA, metabolic diseases, stem cells and cancer.

Our team included a part-time research assistant and 10 senior year students major in Biochemistry. The student helpers were divided into 4 groups and each group worked on a specific topic. They also interviewed the respective teachers to ensure that the contents well align with the course syllabus. Their learning experience in BCHE2000 and in other senior courses was taken when we prepared the content of the micro-module, making this elearn platform student-oriented. The contact time for each topic is about 20-30 minutes, this includes an introduction, interactive timeline for major discoveries, virtual labs (RNAi, Uric acid assays, Immunostaining and Cell apoptosis) presented in animation format and a short exercise. Preliminary survey collected from a small focus group of 7 senior year students indicated that our objective was achieved satisfactory. They all agree that the teaching

materials are clearly presented and easy to follow. Furthermore, the use of virtual laboratories demonstrates the key concepts and techniques and will be helpful for flipped classroom activities. Currently, we are fine tuning the content for the timeline, an animation for alternative splicing and the self-test. Our micro-module https://www.cuhk.edu.hk/culive/vlab_2018 will be released and be adopted by BCHE2000 in the second term of 2018/19.