THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Scheme 1: Basic Scheme

Final Report (2017-18) (Additional Call)

Report due 31 October 2018
Please return by email to The Ad hoc Committee on Planning of eLearning Infrastructure mmcd@cuhk.edu.hk

PART I

Project title: Development of a virtual laboratory for the teaching of immunohistochemistry
Principal supervisor: Prof SK Kong and Dr FH Lo
Co-supervisor(s): Prof PC Shaw, Ms Anita Yiu, Mr Kenneth Leung
Department / Unit: Biochemistry Programme, School of Life Sciences (SLS)
Project duration: From March 2018 to October 2018
Date report submitted: 31 October 2018

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?

Overall, the project ran smoothly; where the objectives remained unchanged.

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 here. Must specify duration of each micro-modules (in terms of students online contact hours), total duration time of all deliverables and style. (With reference to the "Summary of video presentation styles" developed by CLEAR)
Has the nature of the deliverables been changed?
Have you adjusted your timeline?
Overall, was the project completed satisfactorily?

The project development was divided into five phases: 1) Game plan development; 2) Virtual Reality (VR) objects development; 3) VR object integration into the VR environment; 4) Installation of VR hardware; 5) Optimization of the virtual laboratory. Phases 1 to 3 were accomplished. Phases 4 and 5 are scheduled to be completed in October 2018.

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 plans remain the same; the virtual laboratory will be integrated into the laboratory courses in the Biochemistry Programme and the feedbacks from the students will be collected by questionnaire and focus group meetings.

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 have been 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.

A video for e-Learning activities, including the present virtual laboratory, in the Biochemistry Programme has been produced. Moreover, the present virtual laboratory project has been presented in overseas conference in the United States*.

* Details of the presentation
Conference name: Designing Effective Teaching Lilly Conference
Date: 31 May to June 3 2018
Venue: The Bethesda Hyatt Regency, Bethesda, Maryland, United States
Abstract title: Development of a virtual laboratory for the teaching of immunohistochemistry

On the other hand, the present virtual laboratory has set up a model example of the development of VR contents for laboratory teaching; after this project, several similar projects have been initiated in SLS to develop VR contents for laboratory teaching.

In terms of the impact, the virtual laboratory developed can be adopted for the education of the qualification training required by the medical laboratory technologists (http://www.smp-council.org.hk/mlt/en/intro.php).

PART II

Financial data

Funds available:

Funds awarded from MMCDG $ 99,899

Funds secured from other sources $ _____

(please specify_____)

Total: $ 99,899

Expenditure:

Items	Qty (Unit)	Hour(s)	Labour cost per hour	Block grant (50% discount for labour)	Material cost ($50)	Total amount (HK$)	Quotations/ Competitive bids
Courseware development service							
3D model (complicated)	3	35	$260	$13,650	$5,250	$18,900	Quotation offered by ITSC
3D model (common)	10	3	$260	$3,900	$1,500	$5,400	
VR development (HTC VIVE)	1	400	$260	$52,000	$20,000	$72,000	
Poster design	2	7	$260	$1,820	$700	$2,520	
PowerPoint template design	1	4	$260	$520	$200	$720	
Laboratory reagent	1				$359	$359	
					Total	$99,899	

PART III

Lessons learnt from the project

Please describe your way forward.

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?*

We are inspired by the development and use of VR contents for education purposes; VR provides us a new horizon on what we can do and teach in the classroom. With the aid of VR, all students become able to learn to use expensive equipment and to conduct high risk experiments, which were otherwise impossible in the past. After this project, we will continue to develop more virtual laboratory and build up a library of VR teaching contents.

Moreover, as an extension of the evaluation plan, we are planning to conduct some pedagogical studies to evaluate the teaching and learning (T&L) effectiveness of the use of VR for laboratory course.

After the completion of the project, we learnt about the key success factor: it could be to identify the problem(s) and need(s) of our teaching. Once the problem(s) or need(s) were clearly defined, we were able to analyze how VR might play its role to solve the problem(s) or to satisfy the need(s). Technically speaking, Mr Ray Lee from ITSC provided expert advice for us to develop the VR contents. He helped us to solve almost all the difficulties, where the development process ran smoothly from the beginning till the end.

If there is a suggestion to CUHK, we wish CUHK could provide us with sufficient support and time until we have developed a comprehensive library of VR teaching materials, which is necessary for us to learn about the most effective use of the most relevant VR contents for our T&L activities.

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.

Virtual Reality (VR) is a technology allowing the users to enter an artificial environment that cannot be reached in the real world easily. In this project, we aims at applying VR to create a virtual laboratory, such that our students are able to get access to and try using some advanced machine that is not normally available to them. In this virtual laboratory, students can try to practise the procedures of immunohistochemistry (IHC) for the study of cellular pathology.

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: Virtual Reality

Keyword 2: Virtual Laboratory

Keyword 3: Immunohistochemistry

Keyword 4: Cytopathology

(Least relevant) Keyword 5: Biochemistry

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:** *If a publicly accessible project website has been constructed, please provide the URL.* NO, it is not publicly accessible.
(b) **Webpage(s):** *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) here.* https://www.sls.cuhk.edu.hk/index.php/bche
(c) **Tools / Services:** *If you have used any tools or services for the project, please provide names of the tools or services in here.* ITSC VR content development service.
(d) **Pedagogical Uses:** *If any flipped classroom activities have been conducted, please provide information in here. If relevant, please indicate how your project output can be used to support flipped classroom activities.* All the laboratory courses offered by Biochemistry Programme have adopted the flipped classroom pedagogical approach; where the present virtual laboratory will be integrated to the syllabuses of the courses.
(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
Eg1. DEPTXXXX	*1st term 2015*	*50*	*Blackboard*
Eg2: Dept of xxxx	*All 1st year students*	*40*	*facebook*
BCHE4830	*2nd term 2018/19*	*40*	*Tailor-made computer for VR in classrooms/laboratories*

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)	*0*
(b) In workshop/retreat organized for CUHK teachers (e.g. 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 (e.g. 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 publication 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	*1*
(f) A chapter in a book accessible internationally	*0*
(g) A paper in a referred journal	*0*
(h) Others (please specify) promotional video	*1*

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.

Virtual Reality (VR) is a technology allowing the users to enter an artificial environment that cannot be reached in the real world easily. In this project, we aims at applying VR to create a virtual laboratory, such that our students are able to get access to and try using some advanced machine that is not normally available to them. In this virtual laboratory, students can try to practise the procedures of immunohistochemistry (IHC) for the study of cellular pathology.