THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Scheme 3: eLearning Pedagogy Research

<u>Final Report (2015-16)</u>

Report due 31 January 2017
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: Regularization of fundamental chemistry knowledge through online interactive video micro-modules

Principal supervisor: TSE Ying Lung Steve

Co-supervisor(s): MAK Kin Wah Kendrew

Department / Unit: Chemistry

Project duration: From February 2016 to January 2017

Date report submitted: Jan 31 2017

1. Project objectives

Is the project on track to meet its objectives? The project met its objectives to produce and evaluate 8 interactive video micro-modules. Furthermore, we believe the videos successfully provided thorough reviews to students to standardize their diverse backgrounds.

Have the objectives been changed as a result of the experience of working on your MMCDG project? The objectives were not changed.

Has the project created any impact as expected? Yes, it was encouraging to see that students with access to our videos scored 8% higher than the students without access in the final exam.

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. 8 interactive video micromodules were created for CHEM 1070. These videos covered 8 of the most important topics for the introductory chemistry course.

Have the research design, methodology and timeline been changed/adjusted? No, the research design, methodology and timeline were not changed.

Overall, was the project completed satisfactorily? Yes, even though we wish we would have more time to prepare more questions for the videos and make them even more interactive.

3. Evaluation Plan

Have you altered your evaluation plans? No alterations. We evaluated the micromodules based on the performances of the students and their feedbacks.

Does your evaluation indicate that you have achieved your objectives? Yes, by looking at the students' scores both in the midterm and final exams, the students with access to these videos scored significantly higher.

4. Dissemination, diffusion and impact

Please provide examples of dissemination: website, presentations in workshops or conferences, or publications. Our micromodules and results were presented at the CUHK teaching expo.

Please provide examples of impact: how the research results/outcomes/findings can be extended to other disciplines. This project has shown that interactive videos can be effective for reinforcing students' foundation, which is important for technical courses like chemistry courses.

Please describe how the research results/outcomes/findings may support the University's strategic aims in promoting eLearning. Some faculty members are more resistant in adopting eLearning. Asking them to make their own eLearning materials can be hard, but providing the faculty members with the already made videos would be a step forward for them to start trying eLearning.

PART II
Financial data

Funds available:

Funds awarded from MMCDG	$	132,600
Funds secured from other sources (please specify_____)	$	0
Total:	$	132,600

Expenditure:

Item	Budget as per application	Expenditure	Balance
Staff cost (two part-time RAs)	85000	84974.37	25.63
Staff cost (one student helper)	17600	0 (couldn't find one)	17600
Office Equipment		34700.00	
Small Item Equipment	30000	10543.91	-17625.63
Printing and books		2381.72	
Total:	132600	132600	0

<u>PART III</u>

<u>Lessons learnt from the project</u>

Please describe your way forward. We would like to make more videos to cover more topics and include more questions in the future. We have already submitted an application (Courseware Development Grant Scheme 2016-17) for this.

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

- *Key success factors, if any* We had short and easy-to-digest videos that are followed by questions to reinforce what they have just learned.

- *Difficulties encountered and remedial actions taken, if any.* Hiring the RAs and students who have the right skills and are interested in working on this project was very hard.

- *The role of other units in providing support, if any* ELITE provided recording software and hardware. KEEP provided a platform for us to post our videos and ask questions.

- *Suggestions to CUHK, if any*
  - More opportunities should be provided to more people. It also would not hurt if more financial resources can be provided in each grant.

<u>PART IV</u>
<u>Information for public access</u>

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: Chemistry

                     Keyword 2: Video

                     Keyword 3: Interactive

                     Keyword 4: Science

(Least relevant)   Keyword 5: Standardization

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.* Blackboard and KEEP
(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) in here.*
(c) **Tools / Services:** *If you have used any tools or services for the project, please provide names of the tools or services in here.* Recording studio at ELITE and Video hosting by KEEP
(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.*

Table 2: Resource 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
CHEM1070A	*1st term 2016*	*150*	*Blackboard/KEEP*

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	*0*
(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	*0*
(h) Others (please specify)	*0*

3. A one-page brief write up

The motivation to produce these online interactive eLearning video for CHEM 1070 was to regularize the diverse backgrounds of first-year CUHK science students. A good science foundation is one of the most important elements to succeed in university science courses. However, the development of introductory chemistry courses, which play an important role in both Faculty of Science and general education, has met new challenges because of the recent implementation of the 4-year curriculum and the HKDSE framework. Some of our first-year students may have never chosen chemistry as a full/half subject in their HKDSE, and this vastly different secondary school education makes it an exceedingly non-trivial task for constructing foundation courses that effectively prepare our students for their subsequent classes in both the Chemistry Department and other Departments. A major goal of our videos was to lessen the gap between different students so that the learning becomes more efficient for everyone.

Throughout this project, both ELITE and KEEP provided invaluable advice and help for recording and hosting our videos. The ELITE recording studio was instrumental for the production of the videos. The videos could just be put on Youtube, but with the platform provided by KEEP, we were able to organize our videos into sections and subsections for systematic browsing and to ask interactive questions after the videos. We made eight videos in total for some (but not all) of the most important topics in the introductory chemistry course. One of the emphases in our videos was that they would be short, easy-to-digest, and interactive. I would say that the videos were definitely short and easy-to-digest, but I wish we would have more time and resources to make them more interactive by including more variety of questions and graphics.

To understand how the students used our videos, we kept track of the number of view for each video. Consistent with our expectation, the number of views was higher for what we perceived to be more difficult topics. The most popular video scored 123 views, which is a respectable number considering that we did not require the students to use the videos. The most important statistic to evaluate the effectiveness of the videos is to compare the average scores between students with and without access to the videos. While there were small differences between two sections (no two people are ever the same), we had a very good experimental control because we had two different CHEM 1070 sections with the same exams taught by two teachers with a very similar background. What we found was that the students with access to the videos scored about 10% and 8% higher than those without access in the midterm and final exams, respectively. This statistic is a very encouraging figure that hints at the usefulness of the eLearning materials. The section with video access scored a 5.20 "Course Effectiveness" in the CTE, whereas the other section scored a 4.19. The video access was partially, if not wholly, responsible for this large difference. The exam score distributions are attached below for reference.
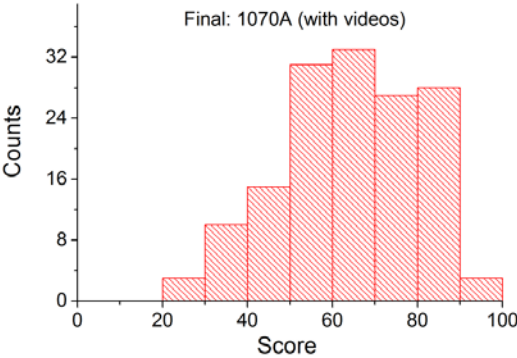
Midterm distributions

Midterm: 1070A (with videos)
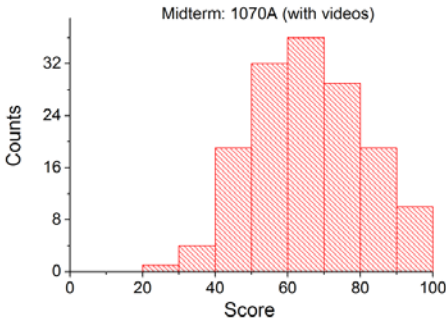
#students: 150
Mean: 65.3
Median: 65
Std dev: 15.1

Midterm: 1070B
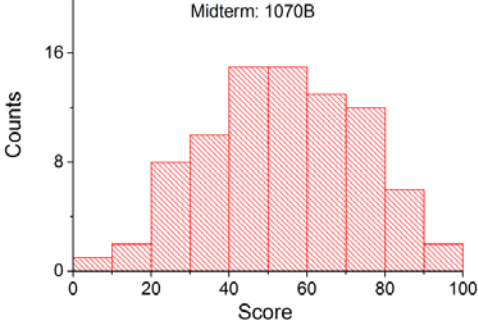
#students: 84
Mean: 54.3
Median: 55
Std dev: 20

Final distributions

Final: 1070A (with videos)

#students: 150
Mean: 64.1
Median: 65.3
Std dev: 16.3

Final: 1070B
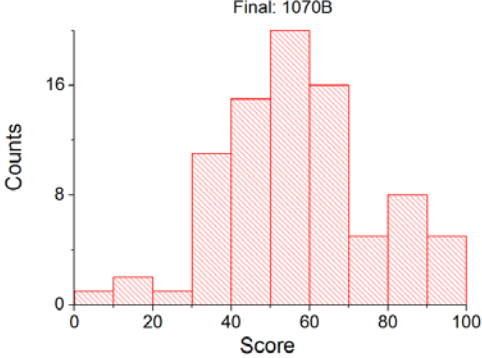
#students: 84
Mean: 56.6
Median: 55
Std dev: 19