

THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Scheme 1: Basic Scheme

Final Report (2016-17)

Report due 30 April 2018

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

PART I

Project title: Flipped Classroom Implementation for Subject, Curriculum and Teaching in Primary Mathematics

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Co-supervisor(s): Dr. CHAN To

Department / Unit: Department of Curriculum and Instruction

Project duration: From May 2017 to April 2018

Date report submitted: 30 April 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?

The project progressed according to the planned schedule. The original objectives have not been changed.

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?

A total of 10 micromodules with total duration of 3 hours have been produced. The number of micromodules produced is much greater than the expected number of micromodules produced (6) as stated in the proposal.

The topics and durations of the micromodules are listed below.

1. Primary mathematics curriculum (duration: 20 minutes)
2. Planning mathematics lessons (duration: 25 minutes)
3. Basic techniques on mathematics pedagogy (duration: 20 minutes)
4. Use of teaching aids in mathematics pedagogy (duration: 20 minutes)
5. Teaching of numbers and algebra (duration: 10 minutes)
6. Teaching of measures, shapes and spaces (duration: 20 minutes)
7. Teaching of data handling (duration: 15 minutes)
8. Preparation for teaching practice (duration: 15 minutes)
9. Mathematics assessment (duration: 20 minutes)
10. Mathematics activities (duration: 15 minutes)

In each of the micromodules, a frontline primary mathematics teacher shared his or her experience on the specified topic. **The presentation style of the videos is interview (S14).**

Pilot implementation of these micromodules have been conducted in this academic year (2017-18) in PGDP5003/5103A and PGDP5003/5013B Subject, Curriculum and Teaching (Major: Mathematics) (Full-time class - total no. of students: 42). These micromodules will also be used in this course in next academic year (2018-19) and possibly later years as well. Some micromodules may also been used in PGDP5113 Subject, Curriculum and Teaching (Minor: Mathematics) in future.

The nature of the deliverables has not been changed. The timeline has not been adjusted. Overall, the project was 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 original evaluation plan has not been changed.

The 10 micro-modules were implemented in 2017-2018. A total of 42 students who enrolled PGDP5003/5103A and PGDP5003/5103B have participated this project. The project was evaluated by students' online access log, students' performance in the pre-class video viewing quiz, lecturer's observation on class dynamic, and focus-group interview.

All students have watched the videos of the micromodules and completed the quizzes according to the timeframe.

The students' scores in the pre-class video viewing quiz were extracted from schoology.com which is an online platform for flipped classroom to take place. Data below from schoology.com showed that they generally scored an average of 95% or above in the quizzes.

Table 1: Average scores of 10 micro-modules from PGDP5003 fulltime students 2017/2018

Topics	Average Scores (%)
1. Primary mathematics curriculum	96.91
2. Planning mathematics lessons	98.10
3. Basic techniques on mathematics pedagogy	98.81
4. Use of teaching aids in mathematics pedagogy	97.38
5. Teaching of numbers and algebra	96.43
6. Teaching of measures, shapes and spaces	99.29
7. Teaching of data handling	98.81
8. Preparation for teaching practice	97.14
9. Mathematics assessment	95.96
10. Mathematics activities	96.67

As compared to previous years, the students were more engaged in class discussions and have more motivation to participate in-class activities.

A focus group interview was conducted to collect feedbacks from students toward the flipped classroom model of learning. Their feedbacks are summarized as below.

1) Perception towards flipped classroom

All interviewers had positive attitude towards flipped classroom.

“It motivates my self-learning as I can watch the pre-class videos regardless of time and location boundary. When I am not familiar with the concepts mentioned in the video, I can search for further information on Internet immediately or let it to be discussed in the classroom. It increases the flexibility of my learning.”

2) Comments on the length of the video

All interviewers felt comfortable with the length of the videos.

“The length is appropriate. Most of them are within ten to twenty minutes per week. They are relaxing and informative.”

3) Comments on content

They found that sharing of real-life experience from frontline math teachers was valuable.

“It is very useful for us to listen to the frontline math teachers’ sharing. It is suggested that we should invite these teachers to cover more difficult math topics, such as fraction and direction.”

4) Comments on quizzes

All interviewers agreed that the quizzes helped them to summarize the key points.

“If I did the questions wrongly, it is a chance for me to look back, think it again and jot

the notes. If I forgot it in the future, I can also review my notes.”

5) Comments on reflection questions

Some interviewers thought the questions were inspiring but not much follow-up actions were done due to time limitation in the lectures.

“Each time, the reflection questions were relevant and inspiring.”

“If I am busy at that time, I can’t spare time for the reflection questions. And not much follow-up actions were done at class due to time limit.”

The above evaluation data indicated that my objectives have been achieved.

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.

Dissemination	<p>This project is/will be presented at two conference events.</p> <ol style="list-style-type: none"> 1. Oral Presentation in CUHK Teaching and Learning Innovation Expo 2017 (7 Dec 2017) 2. Paper presentation (in the format of roundtable) will be presented in EdMedia + Innovative Learning 2018 Conference (an international conference to be held in 25-29 June 2018 in Amsterdam, the Netherlands)
Diffusion	<p>The first event is opened to all faculty staff at CUHK and teachers of other local and overseas institutes. The second event is an international conference on educational media and technology. Participants will include educators, researchers, educational administrators, teachers, curriculum developers and technology & education companies.</p> <p>This project will serve a useful exemplar for teachers of tertiary education who intend to adopt flipped classroom approach to complement the theoretical knowledge and practical knowledge of in their teaching.</p>
Impact	<p>Experience of frontline teachers was shared to the students (pre-service teachers) through the videos in this set of micromodules. This kind of experience is important to students of professional disciplines such as education. It is hoped that this project can inspire colleagues of other professional disciplines to create micro-modules of similar types for their own courses.</p>

PART II

Financial data

Funds available:

Funds awarded from MMCDG	\$	58,000
Funds secured from other sources (please specify _____)	\$	0
Total:	\$	58,000

Expenditure:

Item	Budget as per application	Expenditure	Balance
Student helpers	46,750.00	33,330.00	13,420.00
Front-line school teachers (hired in the form of "contract for services")	8,000.00	3,000.00	5,000.00
Printing and stationeries	3,250.00	7.20 (photocopy)	3,242.80
Total:	58,000.00	36,337.20	21,662.80

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?

I feel excited in working this project. I have three items of reflections.

1. Content of the videos: Inviting frontline teachers to share their experience in the field is definitively the most attractive part of the videos in this project. Quite many colleagues reminded me that the videos should be shorter. Otherwise, the students would not be

interested in viewing it. Yet, this is contrary to what I experienced in this project. The videos are quite long. (The shortest one is 10 minutes whereas the longest one is 25 minutes.) However, most of my students enjoyed in watching the videos. They thought that the sharing in the videos is practical and complementary to the theories taught in the lectures. In other words, the micromodules and the lectures provide different perspectives of the same topic from the eyes of practitioners and university lecturers respectively.

2. Follow-up of reflection questions: This is a challenge to me. I included reflection questions at the end of each video. Initially, I planned to discuss their views on these questions during the lectures. However, the contents of my lectures were quite full. Furthermore, the students were more engaged in participating the in-class discussion and activities as compared to previous years. Hence, more time has been spent on it. The consequence is that there was insufficient time to cover the reflection questions during the lectures. In future, I may need to re-think how I can integrate the micromodules and the lectures more closely and smoothly.
3. Dialogue with the frontline teachers who presented in the videos: The frontline teachers (practitioners) shared their experience and opinions in the videos. This is a one-direction communication, viz. from the practitioners to the students only. After watching the videos, some students had feedback and questions about the practitioners' sharing. However, there is no channel for them to communicate with the practitioners. This is the limitation of this project. Yet, involving frontline teachers to communicate with the students would imply availability of sustainable resource (budget) which looks impossible for a small scale teaching project like this one.

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: Primary mathematics teaching methodology

Keyword 2: Mathematics education

Keyword 3: practitioner experience

Keyword 4: Flipped classroom

(Least relevant) Keyword 5: e-learning

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)
<p>(a) Project website:</p> <p><i>If a publicly accessible project website has been constructed, please provide the URL.</i></p>
<p>(b) Webpage(s):</p> <p><i>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.</i></p>
<p>(c) Tools / Services:</p> <p><i>If you have used any tools or services for the project, please provide names of the tools or services in here.</i></p> <p>Schoology (https://www.schoology.com/)</p>
<p>(d) Pedagogical Uses:</p> <p><i>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.</i></p> <p>Flipped classroom:</p> <ul style="list-style-type: none"> ● quiz (multiple choice questions) ● reflection questions
<p>(c) Others (please specify):</p>

Table 2: Resources accessible to a target group of students (if any)			
<i>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.</i>			
<u>Course Code/ Target Students</u>	<u>Term & Year of offering</u>	<u>Approximate No. of students</u>	<u>Platform</u>
PGDP5003/5103	1 st &2 nd term, 2017-18	42	Schoology
Table 3: Presentation (if any)			Number
<i>Please classify each of the (oral/poster) presentations into one and only one of the following categories</i>			
(a) In workshop/retreat within your unit (e.g. department, faculty)			<i>Please insert no</i>

(b) In workshop/retreat organized for CUHK teachers (e.g. CLEAR workshop, workshop organized by other CUHK units)	<i>Please insert no</i>
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	1 (Dec 2017)
(d) In any other event held in HK (e.g. UGC symposium, talks delivered to units of other institutions)	<i>Please insert no</i>
(e) In international conference	1 (to be held in June 2018)
(f) Others (please specify)	<i>Please insert no</i>

Table 4: Publication (if any)	
<i>Please classify each piece of publication into one and only one of the following categories</i>	Number
(a) Project CD/DVD	<i>Please insert no</i>
(b) Project leaflet	<i>Please insert no</i>
(c) Project booklet	<i>Please insert no</i>
(d) A section/chapter in a booklet/ book distributed to a limited group of audience	<i>Please insert no</i>
(e) Conference proceeding	1 (to be published in June 2018)
(f) A chapter in a book accessible internationally	<i>Please insert no</i>
(g) A paper in a referred journal	<i>Please insert no</i>
(h) Others (please specify)	<i>Please insert no</i>

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.

This project is about implementing a “flipped classroom” for the course of Subject, Curriculum and Teaching in Primary Mathematics offered to the students of PGDP.

As its name suggests, a flipped classroom aims at facilitating students to gain key theoretical concepts before they come to the class and then use class time to engage in discussion about the new information and put those new ideas into practice. Ten micro-modules have been developed on an ePlatform called schoology to cover ten topics in primary mathematics learning and teaching. These ten topics are: 1. Primary mathematics curriculum; 2. Planning mathematics lessons; 3. Basic techniques on mathematics pedagogy; 4. Use of teaching aids in mathematics pedagogy; 5. Teaching of numbers and algebra; 6. Teaching of measures, shapes and spaces; 7. Teaching of data handling; 8. Preparation for teaching practice; 9.

Mathematics assessment; 10. Mathematics activities

For each micro-module, the students have to watch a video of around 15 to 20 minutes. The total duration of the ten modules is 3 hours. Frontline mathematics teachers were invited to share their real-life teaching experience in the videos, such as how to prepare a lesson plan and how to make use of the teaching aids before the class. The videos are presented in the style of interview.

Students are also encouraged to think about the reflections questions posted in the video. The questions will then be discussed in the lesson. Finally, they have to complete a multiple-choice quiz.

For the evaluation plan, this project was assessed by students' performance in the pre-class video viewing quiz, and a focus-group interview. Overall speaking, students were positive towards the flipped classroom and experienced its benefits to their learning. Students generally scored an average of 95% or above of the quizzes. In addition, the analysis of the focus-group interview data indicated that the flipped classroom could motivate students' self-directed learning. According to the participants' views, the real-life experience shared by frontline mathematics teachers was valuable, the length of the pre-class videos was appropriate and the post-video quizzes were useful in guiding them to summarize the key messages given in the videos. At the same time, it was suggested that more difficult math topics could be covered, and more follow-up actions on the reflection questions could be taken during the lectures.

To conclude, the use of a flipped classroom approach enables the students to learn at their own pace because the videos can be watched as many times as they wish. At the same time, course instructors can obtain instant feedback from the quiz analytics so that just-in-time teaching strategy can be implemented in the lectures. It helps create a win-win situation for teachers and students.