THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Scheme 2: Studies in Foundation Courses

Final Report (2015-16)

Report due 31 December 2016
Please return by email to The Ad hoc Committee on Planning of eLearning Infrastructure
mmcd@cuhk.edu.hk

PART I

Project title: UGFN-Animated: Flipped Classroom with Whiteboard Animations

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Department / Unit: Office of University General Education

Project duration: From January 2016 to December 2016

Date report submitted: 31 December 2016

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 objective of this project is to develop micro-modules to flip the classroom of UGFN1000 In Dialogue with Nature (or UGFN for short) using short whiteboard animations. The project is on track to meet this objective. Two micro-modules, namely "Scientific Enquiry of Life" and "Scientific Enquiry of Mind" were developed. Each of them consists of two short whiteboard animations. As explained in the interim report, the experience of working on this project led to the integration of the second ("What is Mind") and the third ("What is Science") micro-modules suggested in the proposal. This integration consolidated the relationship between the central issues related to the scientific enquiry of mind.

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. Has the nature of the deliverables been changed? Have you adjusted your timeline? Overall, was the project completed satisfactorily?

In this project, two micro-modules were developed to flip the classroom of UGFN. The first micro-module "Scientific Enquiry of Life" consists of two short whiteboard animations

"What is life?" (4 min 36 sec) and "Does DNA determine you?" (5 min 50 sec). The second micro-module "Scientific Enquiry of Mind" consists of another two short whiteboard animations "Where does our mind come from?" (5 min 25 sec) and "Do we have free will?" (6 min 38 sec). These deliverables are now available on YouTube.

1st Micro-module – Scientific Enquiry of Life
- Animation 1 "What is life?" [4:36]: https://youtu.be/S7b64RJf3ao
- Animation 2 "Does DNA determine you?" [5:50]: https://youtu.be/12n_74Q-m1I
2nd Micro-module – Scientific Enquiry of Mind
- Animation 3 "Where does our mind come from?" [5:25]: https://youtu.be/T_5EsbjUok4
- Animation 4 "Do we have free will?" [6:38]: https://youtu.be/NJB8XrXXon8

The nature of deliverables and the timeline of this project have not been adjusted. In general, 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?

Survey 1: This was a quiz survey conducted before tutorial classes. It aimed to evaluate the effectiveness of the whiteboard animations on equipping students with the prerequisite knowledge before tutorials. In general, students who watched the animations performed much better than those who did not watch (Figure 1). For example, for each animation, more than
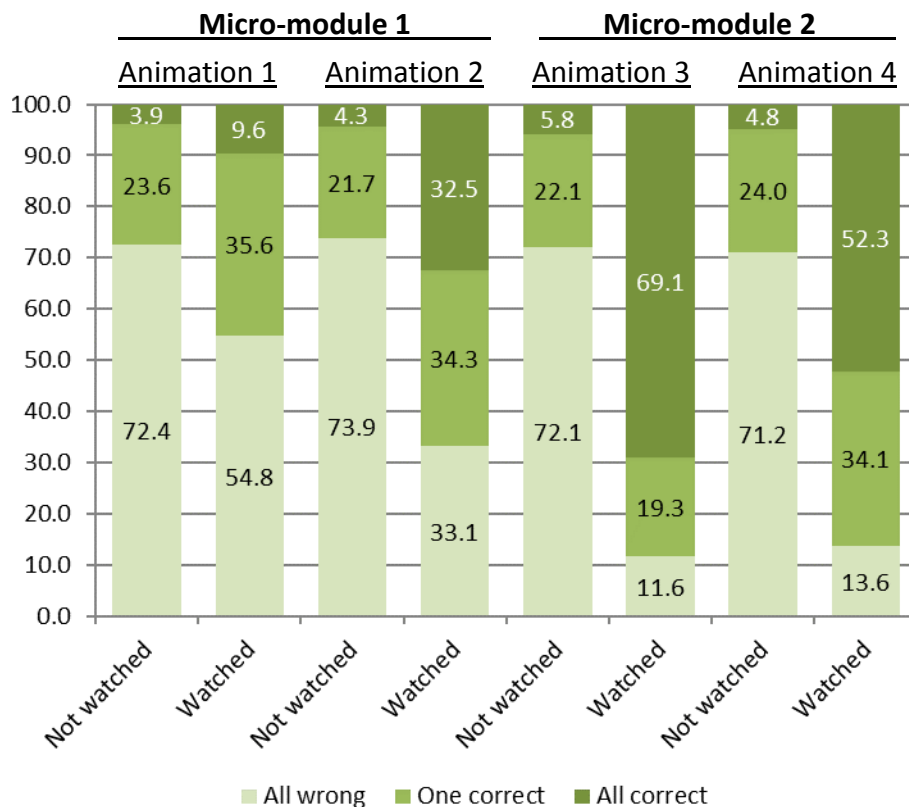

Figure 1 Comparison of quiz performance between students did and did not watch the whiteboard animations before tutorial classes. At the beginnings of the two concerned tutorials (Text 5: Watson, *DNA the Secret of Life*; and Text 8: Kandel, *In Search of Memory*), more than 280 students were asked to answer two multiple-choice questions for each animation. These questions tested students' understanding of the prerequisite knowledge covered in the animations for tutorial discussion. Data distribution is presented in percentage.

70% of students who did not watch the animation got all wrong in the quiz. On the contrary, this figure decreased to 54.8%, 33.1%, 11.6% and 13.6% for students watched animations 1 to 4, respectively (Figure 1). In addition, less than 6% of students who did not watched the animations got all correct in the quizzes. This figure increased to 9.6%, 32.5%, 69.1% and 52.3% for students watched animations 1 to 4, respectively (Figure 1). The data suggested that the animations are effective to equip students with the prerequisite knowledge for discussion before tutorial classes.

Survey 2: This was a questionnaire survey conducted at the end of the tutorials classes. It aimed to assess to what extent the animations have improved students' preparation for the tutorial discussion and enhanced their motivation for studying the course. The results showed that the percentage of students who watched the animations varied among the three team members' classes (40.6%, 68.7% and 75.4%). Data collected from 333 respondents showed that 86.2% students agreed whiteboard animation is more interesting than lecture recording and 87.4% students agreed the animations have raised their interest in the discussed issues (Figure 2). Over 90% students agreed that the animations are helpful for their understanding of the texts, clarifying the concepts and providing knowledge before tutorial classes (Figure 2). There were 86.8% students thought these animations are helpful for the discussion during tutorials and over 80% students agreed they are helpful in reflecting on cross-text issues (Figure 2). Over 90% students thought the level of difficulty of these animations is appropriate. In general, a total of 94.3% students were satisfied with the animations. All these encouraging results indicated that the whiteboard animations had improved students' preparation for the tutorial discussion and enhanced their motivation for studying the course.
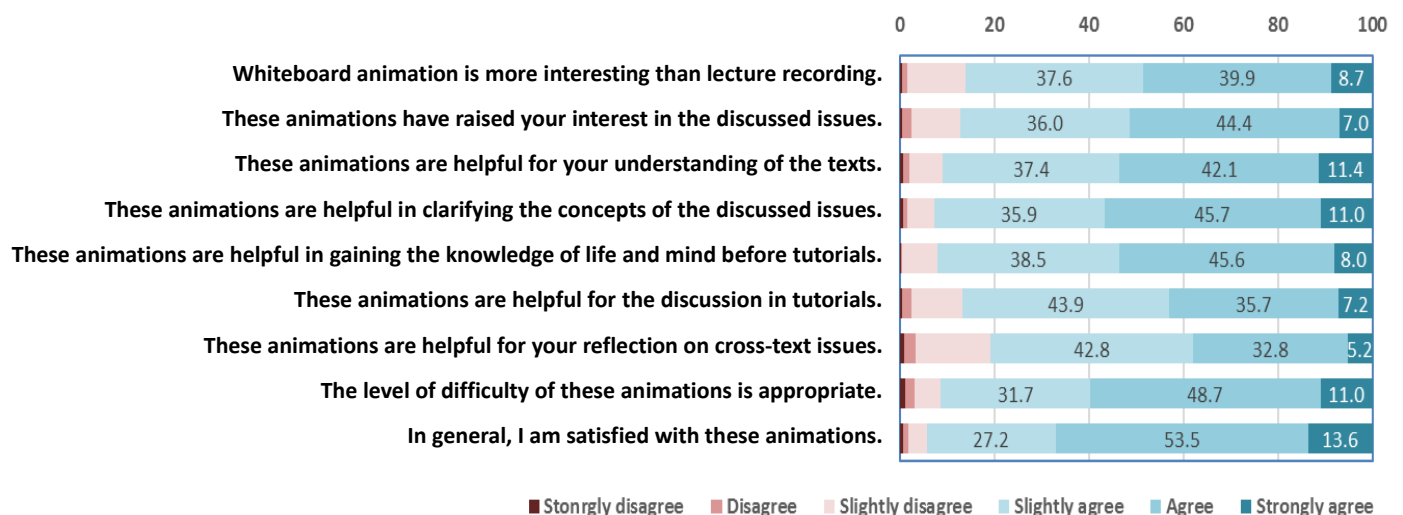

Figure 2 Feedback of the whiteboard animations in the questionnaire survey from 333 students. A 6-point Likert-type scale is used to indicate the degree of agreement on the statements (1: strongly disagree; 2: disagree; 3: slightly disagree; 4: slightly agree; 5: agree; 6: strongly agree). The figures are in percentage.

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

These micro-modules were reported in "UGE NEWS" on 26th Sep 2016 (http://cu-genews.com/2016/09/06/) and distributed in CUHK through mass email. This project was presented in the Mini-conference in General Education Foundation Programme on 12th Dec 2016 and also presented (oral and poster presentations) in Teaching and Learning Innovation Expo in CUHK on 16th Dec 2016.

The two micro-modules were hosted on Echo360 and available on Blackboard for the classes of the three project members (over 350 students) in the 1st term 2016. These micro-modules are now available on YouTube and they will be used in all the classes of UGFN (1800 students per term) starting from the 2nd term 2016. The technical skills for whiteboard animation production will be adopted to produce whiteboard animations on other topics to further enhance teaching and learning of UGFN in the future. These skills can also be used to produce similar whiteboard animations for the sister foundation course UGFH1000 In Dialogue with Humanity.

PART II

Financial data

Funds available:

Funds awarded from MMCDG	$	87,500
Funds secured from other sources	$	0
(please specify_____)		

Total: $ **87,500**

Expenditure:

Item	Budget as per application	Expenditure	Balance
Sparkol VideoScribe Software	23,700.00	23,690.72	9.28
Sparkol VideoScribe SVG Graphics Collections	4,800.00	4,736.43	63.57
Adobe® Creative Cloud™ (one year service)	5,400.00	4,262.40	1,137.60
AudioBlocks (background music library)	0.00	800.00	-800.00
Wacom pen tablet	9,000.00	8,850.00	150.00
Intuos Draw Pen Medium	0.00	2,138.00	-2,138.00
Smart Writing Set and accessories	2,000.00	1,998.00	2.00

RØDE USB microphone	6,000.00	5,620.00	380.00
RØDE USB microphone accessories	2,500.00	1,314.00	1,186.00
Animation artwork by freelance artist	27,500.00	27,500.00	0.00
Student helper ($55/hour)	6,600.00	6,105.00	495.00
Total:	**87,500.00**	**87,014.55**	**485.45**

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?*

This project developed two micro-modules for UGFN1000 In Dialogue with Nature. Instead of conventional video recording of short lectures, attractive whiteboard animations were used to enrich student's learning experience. They enabled step-by-step illustration with voiceover narration to explain complicated and abstract ideas in an attractive and enjoyable way. Using whiteboard animation is one of the key success factors for this project.

To tailor-make the micro-modules for UGFN, it is crucial to identify accurately the prerequisite knowledge for students to have in-depth discussion. Identifying common misconceptions and connections among texts are also important. Once these elements are pinpointed, a short storyboard, preferably within five minutes, should be prepared accordingly to explain the ideas, clarify the concepts and connect the texts. This is quite challenging to integrate all the contents in a five-minute story. Balancing the coverage, depth, precision, accuracy and level of difficulty is not an easy task. It is also good to include daily examples in the storyboard to make the story more interesting and engaging.

Apart from storyboard design, illustrations and graphics design are the key success factors in this project. This is challenging for teachers who do not draw. Purchasing online image library and hiring freelance artists are the remedial actions. In the latter case, a good communication between the team members and the artist is crucial. Beside illustrations and graphics, voice-over narration is also a key success factor. Voice-over narration is an interesting work but it is a surprisingly energy consuming. Energetic voice-over and professional equipment are preferred. The ELITE Center in CUHK kindly provided a studio for the recording of the voice-over narration for two animations. The post-production included editing the animation and voice-over, adding background music and subtitles. These works are not difficult but it is quite time-consuming.

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: In Dialogue with Nature

Keyword 2: Whiteboard Animation

Keyword 3: Scientific Enquiry of Life

Keyword 4: Scientific Enquiry of Mind

(Least relevant)   Keyword 5: Flipped Classroom

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:**   *If a publicly accessible project website has been constructed, please provide the URL.*   1st Micro-module – Scientific Enquiry of Life   • Animation 1 "What is life?" https://youtu.be/S7b64RJf3ao   • Animation 2 "Does DNA determine you?" https://youtu.be/12n_74Q-m1I   2nd Micro-module – Scientific Enquiry of Mind   • Animation 3 "Where does our mind come from?" https://youtu.be/T_5EsbjUok4   • Animation 4 "Do we have free will?" https://youtu.be/NJB8XrXXon8
(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.*   This project was reported in "UGE NEWS" on 26th Sep 2016:   http://cu-genews.com/2016/09/06/

(c) Tools / Services:

If you have used any tools or services for the project, please provide names of the tools or services in here.

The illustrations and graphics were designed by the team members and a freelance artist using Adobe® Creative Cloud™, Wacom Pen Tablet, Intuos Draw Pen Medium, and Moleskine Smart Writing Set. Whiteboard animations were created using Sparkol VideoScribe. Voice-overs were recorded in-house using RØDE USB microphone or at the studio in ELITE Center. Background music was purchased from AudioBlocks.com. The animations were edited with CyberLink PowerDirector 13.

(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.

Two micro-modules were developed to flip the classroom of UGFN1000 In Dialogue with Nature by using short whiteboard animations. Students were encouraged to watch the whiteboard animations to acquire the prerequisite knowledge and clarify conceptions before attending tutorial classes. Hence, more time could be spent for in-depth discussion of the cross-text central issues in the interactive tutorial classes.

(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
UGFN1000 classes L, W and Z	1st term 2016	375	Echo360, Blackboard
All UGFN1000 classes	2nd term 2016 onwards	1800 each term	YouTube

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Table 3: Presentation (if any)	
Please classify each of the (oral/poster) presentations into one and	**Number**

only one of the following categories	
(a) In workshop/retreat within your unit (e.g. department, faculty)	1
(b) In workshop/retreat organized for CUHK teachers (e.g. CLEAR workshop, workshop organized by other CUHK units)	*Please insert no*
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	2
(d) In any other event held in HK (e.g. UGC symposium, talks delivered to units of other institutions)	*Please insert no*
(e) In international conference	*Please insert no*
(f) Others (please specify)	*Please insert no*

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	*Please insert no*
(b) Project leaflet	*Please insert no*
(c) Project booklet	*Please insert no*
(d) A section/chapter in a booklet/ book distributed to a limited group of audience	*Please insert no*
(e) Conference proceeding	*Please insert no*
(f) A chapter in a book accessible internationally	*Please insert no*
(g) A paper in a referred journal	*Please insert no*
(h) Others (please specify): Short whiteboard animations published on YouTube	4

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.

UGFN1000 - In Dialogue with Nature (or UGFN for short), is a foundation course for all undergraduates. The students are required to read core texts before having discussions in a series of interactive tutorials on central issues, such as "What is life?" and "What is mind?" In our experience, students are very keen in reflecting on these cross-text issues. However, many of them, no matter having a background in science or not, find it difficult to have an in-depth discussion. This is mainly because: they lack the prerequisite knowledge beyond the texts; they misunderstand the concepts; or they have an inadequate comprehension of abstract ideas and are unable to connect different texts.

In view of this, we have developed two micro-modules, namely: "Scientific Enquiry of Life" and "Scientific Enquiry of Mind", to flip the UGFN class, and thus provide eLearning supplements for better learning and teaching. A total of four short whiteboard animations have been tailor-made to explain essential knowledge and to clarify misconceptions that might arise. Instead of conventional video recordings of short lectures, whiteboard animations have been created to enrich the students' learning experience. These consist of step-by-step illustrations with voiceover narrations to explain complicated and abstract ideas in an attractive and enjoyable way. The micro-modules are available online for students' self-paced learning.

1st Micro-module – Scientific Enquiry of Life
- Animation 1 "What is life?" [4:36]: https://youtu.be/S7b64RJf3ao
- Animation 2 "Does DNA determine you?" [5:50]: https://youtu.be/12n_74Q-m1I

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- Animation 4 "Do we have free will?" [6:38]: https://youtu.be/NJB8XrXXon8

The micro-modules were used in the three UGFN classes of the project members, which had over 350 students, in the first term of the 2016-17 academic year. The effectiveness of the micro-modules was assessed by quiz and questionnaire surveys. According to the questionnaire survey, over 85% students agreed that whiteboard animations are more interesting than lecture recording and they raised students' interest in the tutorial discussion. The quiz survey suggested that the animations are effective to equip students with the prerequisite knowledge before tutorial classes. This aligned with the questionnaire survey that over 90% students agreed the animations are helpful for their understanding of the texts, clarifying concepts and gaining knowledge before tutorials. In general, more than 94% students were satisfied with these animations. The results are encouraging.

The micro-modules will be full-launched to be used in all UGFN classes starting from the second term of the 2016-17 academic year. Approximately 1800 students per term will be benefited from the micro-modules. In order to further enhance teaching and learning of UGFN, more micro-modules with whiteboard animations will be developed when resources are available. The skills developed in this project can also be used to produce similar micro-modules for the sister foundation course UGFH1000 In Dialogue with Humanity. At last, we would like to thank the IT Governance Committee for the generous financial support. We would also like to thank Office of University General Education and Center for eLearning Innovation and Technology for their support.

Short video:
https://gocuhk-my.sharepoint.com/personal/liming_cuhk_edu_hk/_layouts/15/guestaccess.aspx?guestaccesstoken=9lNrreRf8Jfr2rJmp87O%2b53SH6vXCbpeEsin5qzlLRM%3d&docid=1e6e1ab8a6f0c4599a4fc26dd1dc26836&rev=1