THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Scheme 3: eLearning Pedagogy Research

Final Report (2015-16)

Report due 31 January 2017
Please return by email to The Ad hoc Committee on Planning of eLearning Infrastructure
mmcd@cuhk.edu.hk

PART I

Project title: Effects and Risks of Micro-module Implementation in UGFN1000

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Department / Unit: General Education Foundation Programme, Office of University General Education

Project duration: From February 2016 to March 2017

Date report submitted: 30 Mar 2017

1. Project objectives

Is the project on track to meet its objectives?
Yes, the project is on track to meet its objective.

Have the objectives been changed as a result of the experience of working on your MMCDG project?
No changes in objectives have been made.

Has the project created any impact as expected?
The findings of the project have informed teachers about the possible effects and risks of micro-modules implementation. This helps the teachers to develop more suitable micro-modules for the students. The findings were presented in local and international conferences, which could have boosted the development of micro-modules.

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.

The team has produced 134 videos in total, with support of two MMCD grants. The micro-modules were used in UGFN1000 "In Dialogue with Nature". The micro-modules aim at supplementing students' basic science knowledge and historical and technical background for extended discussion.

Have the research design, methodology and timeline been changed/adjusted?
The overall research design has not been changed. The project still aims at studying the effects and risks of micro-modules implementation in UGFN1000 using both quantitative and qualitative approaches.

There were two adjustments in the methodology. First, an online survey has been added to the project. The online survey aims at investigating the research question, from the perspective of micro-modules users. This complements with the entry-exit survey which measured the influence of micro-modules to the whole class. Second, individual interview has replaced focus group. 17 students participated in the interview instead of the originally proposed four focus groups. The total number of participants should be similar. The change is due to the various schedules of the participants.

Regarding the timeline, the project's end date has been extended from January 2017 to March 2017 to allow us to study the effects of micro-modules implementation in 2016-17T1. Indeed, the interviews were arranged in mid-February and the subsequent analysis was in March.

Overall, was the project completed satisfactorily?
We regard the project satisfactorily completed. The research questions were addressed, with a small change in the methodology. **Two reports, one on quantitative analysis and one on interview study, are attached as Appendix.**

3. Evaluation Plan

Have you altered your evaluation plans?
The evaluation plan has not been altered.

Does your evaluation indicate that you have achieved your objectives?
Two papers and one conference proceedings were published in peer-reviewed international journals. The results of the study were presented in two international conferences and the Teaching and Learning Innovation Expo 2016. These indicated that the project was successful in achieving the objectives.

4. Dissemination, diffusion and impact

Please provide examples of dissemination: website, presentations in workshops or conferences, or publications.

The study was presented in two international conferences and the CUHK Expo:

1. Kiang, K. M. "Improving the effectiveness of a science classics-reading course through the use of micro-modules." The 47th Annual ASERA Conference, June 27-July 1, 2016, Canberra, Australia.

2. Ng, A. K. L., Cheung, D. H. C. and Kiang, K. M. "E-learning implementation in a compulsory science general education course." Multidisciplinary Academic Conference on Education, Teaching and Learning, December 9-10, 2016, Prague, Czech Republic.

3. Kiang, K. M., Cheung, D. H. C., Ng, A. K. L. and Wu, V. J. "Micro-modules for UGFN1000 classroom flipping." Teaching and Learning Innovation Expo 2016, December 16, 2016, Hong Kong.

4. Cheung, D. H. C., Ng, A. K. L., Kiang, K. M. and Chan, H. Y. "Effects and risks of micro-module implementation in UGFN1000." Teaching and Learning Innovation Expo 2016, December 16, 2016, Hong Kong.

Part of the study was published in two international peer-reviewed journals and one conference proceedings:

1. Ng, A. K. L., Kiang, K. M., Cheung, D. H. C. (2016) Assessing Students' Attainment in Learning Outcomes: A Comparison of Course-End Evaluation and Entry-Exit Surveys. *World Journal of Education,* 6: 56-65.

2. Kiang, K. M., Chan, H. Y., Ng, A. K. L., and Cheung, D. H. C. (2016) Effectiveness of Micro-Modules in a Science Classics Course. *American Journal of Educational Research*, 4: 917-926.

3. Ng, A. K. L., Cheung, D. H. C. and Kiang, K. M. (2016) E-learning implementation in a compulsory science general education course. Proceedings of MAC-ETL 2016, 100-108.

Please provide examples of impact: how the research results/outcomes/findings can be extended to other disciplines.

The research demonstrated that micro-modules which supplement foundation knowledge, historical and technical background to students in UGFN1000 were effective in helping students to attain the learning outcomes. The risks to lecture attendance, teacher-student interaction were shown to be minimal. These findings could be useful to other general education courses which adopts a similar approach in teaching. Moreover, the methods adopted in this research could be extended to other courses to evaluate the learning aids concerned.

Please describe how the research results/outcomes/findings may support the University's strategic aims in promoting eLearning.

Micro-module development for classroom flipping is highly promoted in CUHK's Academic Development Proposal for 2016-2019. The present study is evidence-based and evaluated the implementation of micro-modules by both quantitative and qualitative methods. The concerned micro-modules are implemented in UGFN1000, which is a compulsory general education foundation course in CUHK. A large number of students, which comes from different faculties, are involved in this study. Therefore, students' opinions on the effect and risk on micro-modules implementation are deemed to be representative. Their opinions presented in this study would be valuable for other general education courses and possibly provide insight for the University to identify its way forward for eLearning.

PART II

Financial data

Funds available:

Funds awarded from MMCDG	$ 150,000
Funds secured from other sources (please specify_____)	$ 0
Total:	$ 150,000

Expenditure:

Item	Budget as per application	Expenditure	Balance
Hours of work by a research Assistant (data collection, entry and analysis)	99,819.79	99,819.80	-0.01
Hours of work by student helpers (focus group transcription, participants of focus group interviews)	5,500	5,665.00	-165.00
Publication costs	5,000	2,415.34	+2,584.66
Miscellaneous items (e.g. printing of surveys, posters)	3,680.21	6,050.00	-2,369.79
Conference expenses	36,000	36,000	0.00
Total:	150,000	149,950.14	+49.86

PART III

Lessons learnt from the project

Please describe your way forward.

We intend to develop more micro-modules for the course UGFN1000, with the aim of covering all required texts. Besides, we decide to make the micro-modules as a compulsory part in the course. The micro-modules will be coupled with a discussion forum. The effectiveness of micro-modules can then be assessed from teacher's perspective through content analysis of the forum postings. This also gives us the opportunity to compare the roles of two modes of learning, conventional 'face-to-face' interaction and 'online' discussion forum-coupled micro-modules, in a blended learning environment. This should guide a better management of their contact hours.

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

- *Key success factors, if any*

There are several factors which contribute to the success of this project: (1) prior planning of the entry-exit survey; (2) suitable arrangement of the online survey and interviews; (3) timely hiring of a research assistant to help with the project; and (4) effective communication with the participating teachers.

- *Difficulties encountered and remedial actions taken, if any*

We had difficulties in analyzing the term paper scores of the students. As term paper questions change every semester, it is not possible to perform a fair comparison between semesters. We will avoid this kind of comparison in the future.

We also encountered difficulties in analyzing students' engagement through CTE scores. This is due to the reason that CTE data of different teachers were not readily accessible. We decided to use data from a limited number of teachers who agreed to share the CTE scores.

- *The role of other units in providing support, if any*

We did not collaborate with other units in this evaluation project.

- *Suggestions to CUHK, if any*
  - *Example: what should be done differently?*

From the free comments of the students, they found that the KEEP platform is not easy to access. It requires them to register another account. This is one of the barriers for students to access the micro-modules. It suggested that students could use the current OnePass system to log in.

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: Micro-modules

Keyword 2: General Education

Keyword 3: Effect

Keyword 4: Risk

(Least relevant)   Keyword 5: Survey

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.*
(b) **Webpage(s):**   The micro-modules project was featured in UGE News: http://cu-genews.com/category/learning-resources/%E7%B6%B2%E4%B8%8A%E8%   AC%9B%E5%A3%87-micro-module/
(c) **Tools / Services:**   Services: ITSC, ELITE, KEEP; Tools: SPSS, NVivo.
(d) **Pedagogical Uses:**   Students are expected to watch the micro-modules at their own time to consolidate their basic science knowledge and to reflect on the core questions of the course.

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
UGFN1000	*1st and 2nd term 2016-17*	*500*	*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)	*Please insert no*
(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	*2*
(f) Others (please specify)	*Please insert no*

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	*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	*1*
(f) A chapter in a book accessible internationally	*Please insert no*
(g) A paper in an referred journal	*2*
(h) Others (please specify)	*Please insert no*

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.

Teachers of the general education foundation course UGFN1000 "In Dialogue with Nature" have produced a series of micro-modules, with a total of 134 videos hosted on KEEP, to supplement the students with basic science knowledge as well as further historical and technical background knowledge related to the core questions. This project is to evaluate the effects and risks of micro-modules implementation in both quantitative and qualitative approaches.

Quantitative Study

Students who have watched the micro-modules were invited to participate in an online survey. From the 55 valid responses, students generally thought that the micro-modules helped them to attain the intended learning outcomes (ratings ranged from 4.02 to 4.33 in a 6-point Likert scale). Students also thought that watching micro-modules enhanced their understanding of the text (4.51), allowed them to have in-depth reflection (4.18), enhanced their performance in tutorial discussion (4.11), and in some degree enriched the materials for their written assignments (3.78). Regarding the potential risks of micro-modules implementation, students did not think that watching micro-modules had negative impacts to their lecture attendance, motivation to read and discussion with fellow classmates and teacher (ratings ranged from 2.29 to 2.47). Moreover, a longitudinal analysis of the Course and Teaching Evaluation results did not show much difference before and after implementing the micro-modules on KEEP, on items such as effective communication, lecture and tutorial attendance, assigned text read and discussion with teacher.

Interview Study

A total of 17 students have joined an interview study to express their views towards the effects and risks of micro-modules implementation in UGFN1000. Most students recalled that they watched the micro-modules after lecture and before tutorial discussion. All interviewees reported that watching micro-modules had no negative impacts to their lecture attendance, as they recognized that lecture focused on the assigned texts while micro-modules are more about basic science knowledge and extended discussion. All interviewees also thought that watching micro-modules did not discourage them from reading the assigned texts, with 3 of them even reported that they had more motivation to read. A majority of interviewees (70.6%) opined that watching micro-modules helped them better understand the assigned texts, with the major reason that the fundamental concepts in the texts were covered in the micro-modules. More than half of the interviewees (58.8%) expressed that the micro-modules enhanced their tutorial discussion. 7 of them claimed that understanding the basic concepts through watching micro-modules could help them better engage during the discussion. Regarding discussion with teachers, no students claimed that watching micro-modules discouraged them to discuss with teacher, with 2 of them showing

increased motivation to discuss with teachers. For written assignment, around one-fourth of the interviewees found the micro-modules useful, as students thought that micro-modules provided them with a solid background and concrete examples for constructing their papers. There are several unexpected positive impacts identified during the interview, which includes learning and recalling scientific knowledge not directly related to the assigned texts, increasing interests to science-related issues and increasing understanding and appreciation towards Chinese science and medicine.

Conclusion

Overall, both the quantitative analysis and interview study showed that micro-modules implementation in UGFN1000 is effective, and no apparent risks have been identified.

Appendix

1. Report on quantitative analysis

In this research, the effects and risks of micro-modules implementation in UGFN1000 were evaluated quantitatively by *entry-exit survey, online survey, CTE analysis and term paper scores*, and qualitatively by *interview with the users*.

(A) To evaluate the effectiveness of the two sets of micro-modules in students learning outcome attainment

(i) By entry-exit survey

Students' attainment on six intended learning outcomes (ILOs) of UGFN1000, listed in table 1, were evaluated.

Table 1. Intended learning outcomes of UGFN1000.

	Intended Learning Outcomes (ILOs)
ILO1	I am interested in natural science.
ILO2	Scientific knowledge is important for my intellectual pursuit.
ILO3	I understand the development of natural science.
ILO4	I understand various features of scientific methods.
ILO5	I understand the contributions and limitations of scientific inquiry.
ILO6	I can assess the social implications of scientific inquiry.

Two student surveys, with same set of questions, were distributed to students at term start and term end. Students' self-perception of learning outcome attainment is measured at two different time points using a six-point Likert scale. The data gathered in the entry survey can act as a defined baseline to evaluate the changes of students after taking the course. Both latitudinal and longitudinal comparisons were done in this study.

The latitudinal comparison was done in 2016-17 T1, the students' perceived attainments in the entry-exit survey are compared between students who have USED the micro-modules (USED) and students who did NOT USE the micro-modules (NOT-USED). The result is listed in table 2. The changes in students' perceived ILOs attainments are comparable between two groups. However, if we focus on the data of exit survey, we can see the attainment of perceived ILOs in the USED group is higher than that of the NOT-USED group in all items. This suggested that students who have used the micro-modules had a higher perceived ILOs attainment in general.

Table 2. Latitudinal comparison on students' perceived attainment on ILOs

	USED (N=103)			NOT-USED (N=306)		
	Entry	Exit	Change	Entry	Exit	Change
ILO1	4.31	4.52	+0.21	4.08	4.44	+0.37
ILO2	4.44	4.88	+0.43	4.35	4.73	+0.38
ILO3	3.45	4.63	+1.18	3.27	4.46	+1.19
ILO4	3.73	4.77	+1.04	3.53	4.64	+1.11
ILO5	3.94	4.69	+0.75	3.82	4.65	+0.82
ILO6	3.89	4.69	+0.81	3.77	4.57	+0.79

In the longitudinal comparison, students' perceived attainments in the entry-exit survey are compared between students in 2015-16 T2 and 2016-17 T1. The micro-modules were not yet launched as a KEEP course and only limited amount of videos were available in 2015-16 T2. This group of students can act as control group to see if there is any change in ILOs attainment if student can access more videos in KEEP. The result is shown in table 3. The changes in students' perceived ILOs attainments are similar in the two semesters. This may due to the fact that the micro-modules in KEEP are still in development stage in the concerned semester. The usage of the micro-modules is entirely voluntary. Therefore the usage rate is not that high and the effectiveness may not be truly reflected in such longitudinal comparison. To address this weakness, we have established an online survey to see if the micro-modules could actually enhance the ILOs attainments of the users.

Table 3. Longitudinal comparison on students' perceived attainment of ILOs

	2015-16 T2 (N=402)			2016-17 T1 (N=420)		
	Entry	Exit	Change	Entry	Exit	Change
ILO1	4.31	4.62	0.31	4.13	4.48	0.35
ILO2	4.57	4.91	0.33	4.38	4.78	0.40
ILO3	3.45	4.61	1.15	3.30	4.51	1.20
ILO4	3.65	4.70	1.04	3.56	4.67	1.11
ILO5	3.84	4.76	0.92	3.85	4.66	0.81
ILO6	3.85	4.67	0.82	3.80	4.60	0.80

(ii) By online survey

After the end of 2016-17 T1, students who have used the micro-modules were invited to participate in an online survey in CUHK e-Survey system, which includes both positive and negative statements, to express their views on the effects of micro-modules implementation. 59 survey data were collected and 55 of them were valid responses. Both the impact of micro-modules implementation on ILOs attainment and course delivery and assessment were evaluated and shown in table 4 and 5 respectively. In table 4, the average ratings on all items

are above 4, which suggested that watching micro-modules increased students' attainment on the ILOs. Besides the ILOs attainment, as shown in table 5, the micro-modules could also have positive effects on enhancing students' understanding on the text content, having more in-depth reflection on related issues, enhancing performance in tutorial discussion and providing materials for their written assignments.

Table 4. Impact of micro-modules on ILOs attainment.

Watching micro-modules…		No. of students rated						Average
		1	2	3	4	5	6	
Q2	increased my understanding on the development of natural science.	0	1	5	25	23	1	4.33
Q13	increased my understanding on the features of scientific methods.	1	1	5	29	18	1	4.18
Q12	increased my understanding on the contributions and limitations of scientific inquiry.	1	2	5	28	18	1	4.15
Q6	increased my interest in natural science.	1	2	8	27	14	3	4.09
Q5	enhanced my reflection on the social implications of scientific inquiry.	1	1	7	35	9	2	4.02

Table 5. Impact of micro-modules on course delivery and assessment.

Watching micro-modules …		No. of students rated						Average
		1	2	3	4	5	6	
Q9	enhanced my understanding on the text content.	1	0	2	23	25	4	4.51
Q10	allowed me to have more in-depth reflection on the related topics.	1	1	5	30	16	2	4.18
Q3	enhanced my performance in tutorial discussion.	1	1	9	27	14	3	4.11
Q7	enriched the materials in writing reflective journal/ term paper.	2	5	13	20	13	2	3.78
Q14	enhanced my performance in quiz.	1	8	12	20	14	0	3.69

(iii) By term paper scores

Initially, we planned to investigate the effect of micro-modules on students' learning outcome attainment from teachers' perspective by comparing the term paper score before and after micro-modules implementation. However, the term paper topics changed in the concerned semesters. Therefore, the scores of term papers are not comparable as they are addressing different kinds of questions.

(iv) By interview with users

The report of interview is attached in another document.

(b) To study the risks or threats in eLearning implementation by investigating the impact of the two sets of micro-modules towards other learning activities.

(i) By online survey

The online survey mentioned in a (ii) was also used to examine the potential risk of micro-modules implementation. Its impacts on students' motivation to study as well as interaction with others were investigated and the data is shown in table 6. The statements were asked in a negative manner. The rating on all items are smaller than 2.5, which suggested that students do not think that watching micro-modules discouraged them to discuss with course teacher and fellow classmates, attend regular lectures and read the assigned texts. There is no significant risk was found in micro-modules implementation.

Table 6. Impact of micro-modules on motivation to study/ interaction with others.

| Watching micro-modules … | | No. of students rated | | | | | | Average |
		1	2	3	4	5	6	
Q11	discouraged me to discuss with UGFN course teacher.	14	16	16	5	3	1	2.45
Q4	discouraged me to attend regular lectures.	13	24	8	7	3	0	2.33
Q8	discouraged me to discuss with fellow classmates in tutorials.	12	24	12	5	2	0	2.29
Q1	reduced my motivation to read the texts.	9	23	13	8	2	0	2.47

(ii) By CTE analysis

CTE data was extracted to evaluate longitudinally the impact of micro-module implementation by tracking the trend of students' overall perception on the course engagement and teacher-student interaction. Students' perceptions on "Communication was effective", "Discussed with teacher outside of class", "% of assigned readings read", "% of lectures attended" and "% of tutorials attended " are measured in a six-point Likert scale. These aspects are the concerns frequently cited by teachers upon micro-modules implementation. Students in 2015-16 T2 constituted the control group as the micro-modules were not launched as a KEEP course and only very limited videos were available. The students' ratings on the above questions are compared with that of 2016-17 T2, in which 134 videos are launched in KEEP. The comparison is shown in table 7. Students' ratings on the concerned items are generally comparable between the two semesters. This suggested that there is no significant risk of micro-module implementation on students' course engagement and teacher-student interaction.

Table 7. Longitudinal comparison on students' perception on course engagement and teacher-student interaction.

	2015-16 T2 (N=244)	2016-17 T1 (N=255)
	Average rating	Average rating
Communication was effective	5.72	5.72
Discussed with teacher outside of class	3.26	3.15
% of assigned readings read	5.11	5.26
% of lectures attended	5.25	5.47
% of tutorials attended	5.96	5.96

(iii) By interview with the users

The report of interview is attached in another document.

2. Report on interview study

Summary

A total of 17 students have joined an interview study to express their views towards the effects and risks of micro-modules implementation in UGFN1000. Most students recalled that they watched the micro-modules after lecture and before tutorial discussion. All interviewees reported that watching micro-modules had no negative impacts to their lecture attendance, as they recognized that lecture focused on the assigned texts while micro-modules are more about basic science knowledge and extended discussion. All interviewees also thought that watching micro-modules did not discourage them from reading the assigned texts, with 3 of them even reported that they had more motivation to read. A majority of interviewees (70.6%) opined that watching micro-modules helped them better understand the assigned texts, with the major reason that the fundamental concepts in the texts were covered in the micro-modules. More than half of the interviewees (58.8%) expressed that the micro-modules enhanced their tutorial discussion. 7 of them claimed that understanding the basic concepts through watching micro-modules could help them better engage during the discussion. Regarding discussion with teachers, no students claimed that watching micro-modules discouraged them to discuss with teacher, with 2 of them showing increased motivation to discuss with teachers. For written assignment, around one-fourth of the interviewees found the micro-modules useful, as students thought that micro-modules provided them with a solid background and concrete examples for constructing their papers. There are several unexpected positive impacts identified during the interview, which includes learning and recalling scientific knowledge not directly related to the assigned texts, increasing interests to science-related issues and increasing understanding and appreciation towards Chinese science and medicine. Overall, the interview study has shown that micro-modules implementation in UGFN1000 is effective, and no apparent risks have been identified.

Methods

17 students who took UGFN1000 in 2016-17T1 voluntarily participated in the study. They were individually interviewed by a research assistant. The interviews lasted for about 15 minutes each. The interviews were recorded and transcribed. The transcripts were coded by two independent researchers according to a list of agreed themes. The two researchers then discussed and reached a consensus of each assigned code.

Results

From the interviews, students often reported that they watched the micro-modules after the lecture and before the tutorial discussion. In this section, students' perceived effects and risks of micro-modules implementation in UGFN1000 will be reported in the sequence of their learning experience, starting from attending lecture, to reading assigned texts, to tutorial discussion, to discussion with teachers and finally, writing written assignments.

On lecture attendance

Students were asked to comment on whether watching micro-modules influenced their lecture attendance. No students stated that watching micro-modules have negative or positive effect. All interviewees claimed that watching micro-modules have no impact to their lecture attendance. 11 out of 17 interviewees (64.7%) commented that micro-modules and regular lectures serve different purposes. They have expressed similar opinions that regular lectures focused more on the texts and information directly related to the texts. For the micro-modules, students have more diverse opinions, 4 opined that micro-modules supplement the basic knowledge in science, while another 4 thought that micro-modules extend from the texts. This is likely related to the different video clips that students watched.

> "(It is) because I found that, although the micro-modules I have watched and the lectures I have attended were around the same theme, they were of very different contents. The theme could be the same but what the content covered was very different. For example, lectures centered more on the assigned readings. All the supplementary information in the lectures was about the assigned readings. However, what the micro-modules provided were quite general, like some general knowledge. Regarding the lesson on Newton, the lecturer may briefly explain about what Newtonian Laws were and the bibliography of Newton in the lecture. But then, the lecturer would not go into detail. Some physics terms, like what speed, velocity and acceleration are or the difference between mass and weight, were not explained in detail. Well, I should say some basic and fundamental things were complemented by these [micro-modules]."
>
> (Anthropology, Year 2, 15.62-15.70)
>
> "No effects (on my attendance to lecture). (It is because) they [the micro-modules] were actually for some extension... The lectures are about the assigned text (but) these [micro-modules] covered the content which is beyond the curriculum."
>
> (Insurance, Finance and Actuarial Analysis, Year 2, 17.54)

On the motivation of reading assigned texts

Concerning the motivation of reading, no students thought that watching micro-modules discouraged them to read the assigned texts. 3 out of 17 interviewees (17.6%) reported to have increased motivation in reading. They thought that the content of micro-modules could enhance their interest on the assigned readings and provide background knowledge for them to read the texts more easily.

> "Well… yes. As the texts are lengthy, and are full of words. So… reading the texts was boring. But if I watched some lectures [micro-modules] before I read the text, firstly I felt more interested. Also, (I) would know briefly about the text content so I had a greater interest when I read the assigned text."
>
> (Economics, Year 1, 11.50)
>
> "Yes, because… watching (the micro-modules) could give me an impression to

understand the (assigned) texts. Nevertheless, if (I) only watched the micro-modules without reading the texts, (I) won't understand any of the content (of the assigned texts)."

<div align="right">(Community Health Practice, Year 1, 18.26)</div>

5 out of 17 interviewees (29.4%) do not show any change in reading motivation upon watching the micro-modules. They recognize that the content of micro-modules is different from that of the assigned texts. Therefore, they would still read the textbook as usual.

"Yes. Because these (micro-modules) were not related to the texts."

<div align="right">(Business Administration, Year 1, 5.20)</div>

On understanding of assigned texts

Students were asked if watching micro-modules helped them understand the assigned texts. No students reported any negative impact. 12 out of 17 (70.6%) revealed that the micro-modules have positive impacts towards their textual understanding.

Among the 12, 3 students pointed out that micro-modules have both visual and audio components, which make them understand the abstract concepts or experiments in the texts better:

"Yes [the micro-modules were helpful] for example, regarding the topic of consciousness, when I read the text initially, I felt that it was complicated. And the text is all in words, (I) could barely understand how the experiments actually worked, or how particular effect was resulted. But micro-modules contain both audios and visuals, and the lecturers described some experiments in details. (The micro-modules) even provided us one or two more different types of experiments, to prove if consciousness or freewill exists or not. This is better."

<div align="right">(Business Administration, Year 2, 10.37)</div>

Another 9 students expressed that micro-modules provide them with some understanding of the fundamental principles mentioned in the assigned texts, for instance, Newton's three laws of motion and the Chinese yin-yang-wu-hsing theory. When they came across these principles in the texts, they understood the meaning behind.

"For instance, (regarding the text about) Newton, for people like me who had no science background, the micro-modules introduced some basic physics knowledge. That helped me understand the meaning of formulas when I read the text."

<div align="right">(Social Science, Year 1, 1.28)</div>

"I think the best part of his speech was that he asked us to lay down the western worldview first. Then (I) listened to his explanations of "everything was composed of Qi". The Qi then differentiated into Yin and Yang. He also talked about the current Taiji symbol should actually be symbols of Yin and Yang but not Taiji, because Taiji should be more alike Qi, which was not differentiated. He then talked about wu hsing. That was similar to the texts but his explanation was easier to follow. Although he did not explained it thoroughly, it was easy enough (for me) to understand the text."

6 out of 17 interviewees (35.3%) thought that watching micro-modules bear no or little relations with their understanding of the texts.

> "Really not [helpful in understanding the texts]. Because this split brain (experiment) was really not related to the texts. He talked about consciousness and then extended to split brain (experiment)."
>
> (Insurance, Finance and Actuarial Analysis, Year 2, 17.40)

It should be noted that one student has watched several video clips, and he opined that some are helpful to his understanding of the texts, while some have no impacts. His case therefore belongs to both categories.

On tutorial discussion

Students were asked about the effects of micro-modules on their tutorial discussion. No interviewees expressed any negative impact. 10 out of 17 students (58.8%) thought that watching micro-modules could help them better perform in tutorials. Three direct benefits were mentioned by the interviewees.

(i) 7 students expressed that micro-modules helped them better understand the basic concepts and thought about the issues at an earlier stage, so that they could be better engaged during the discussion.

> "I think (they are) helpful. I watched some (videos) about Chinese worldview and Chinese medicine... I didn't understand the text when I read it, watching the videos could help me comprehend the theory, so I could have a smoother discussion during tutorials."
>
> (Biochemistry, Year 2, 3.42)
>
> "When I watched the videos, the lecturer has asked several (reflective) questions. For example, for the text on Needham, he mentioned that we had to accept the two worldviews are different. And we shouldn't regard the western one as true. Actually these questions were also addressed in the tutorial. As I could think more when I watched the video instead of starting the thinking process at the tutorial, I could engage in the tutorial discussion but not just listen to the others."
>
> (Sociology, Year 2, 7.60)

(ii) 4 students opined that they could use the materials in micro-modules as examples during the tutorial discussion.

> "Yes in a certain way, because the micro-modules are about some physics knowledge... When I attended the tutorial, we were divided into groups. My groupmates did not know much (about Physics), so I could take this opportunity to share some knowledge on this aspect. That is, I knew a little bit more than the others. This helped me engage more in the discussion."

"I would include it [the content of the micro-modules] into (the tutorial discussion). For example, I learnt something from the micro-modules, which could help me understand more about the issue. Then, I could use it in the class. Those classmates, who probably did not watch the micro-modules, would know more about the issue after hearing from me. I think this could facilitate the whole discussion."

(Science, Year 1, 4.36)

(iii) 2 students stated that after watching the micro-modules, they could understand the ideas mentioned by other students in the group.

"I remember, in the latter half of a lesson, (the lecturer) asked us a question. If we shake the gun forcefully and fire a bullet at the same time, will the shaking change the speed of the bullet? At that moment, I thought it might be possible if the force was strong to a certain extent. But they [his groupmates] explained to me, according to Newton Laws, how the bullet moved forward and how could the bullet change direction. As I watched the videos before listening to them, so I could understand their explanation. But if I did not, I guess I would not understand what they were talking about and could barely respond to them."

(Chinese Language and Literature, Year 2, 14.2)

"Well, they are helpful. (After watching to the micro-modules, I) could understand what other students talked about. As we come from different background, they were more familiar with that text and they used more academic terminology. I can then make use of the micro-modules – I could get a rough idea of the knowledge in that area so I could follow their discussion more easily."

(Social Science, Year 1, 1.36)

7 out of 17 interviewees (41.2%) said that micro-modules have no impact to their tutorial discussion, although the video clips could help them better understand some terms and concepts related to the assigned texts.

"It helped me more on understanding but not in discussions. This is because the tutorial discussion focused more on the texts, while micro-modules were, related to the texts in some sense, but not directly related to them. They are different."

(Business Administration, Year 1, 5.59-5.51)

On the motivation of discussion with course teacher

This section examined the impact of watching micro-modules on the motivation of discussion with teacher. No student claimed that watching micro-modules discouraged them to discuss with teacher. 2 out of 17 interviewees (11.8%) showed increased discussion motivation with teacher. They reasoned that watching micro-modules can allow them to understand the issues in a boarder perspective. This triggers them to discuss with the teachers on those viewpoints from the videos.

"Not at all [Would not reduce motivation to discuss with teacher at all]. (I) would have even more questions to ask my teacher. As I have read more information from different sources, I would wonder and ask which one was correct or could be adopted. Especially when I did the term paper, I had more ideas and would want to discuss with my teacher more."

(Business Administration, Year 2, 10.49)

"(I consider this) from two perspectives. They [the micro-modules] let me ask fewer questions on basic knowledge but I could ask more extended question. If I did not watch them, I would just focus on things that I didn't understand. I would ask questions like "can you explain more" or "how does it work". But after I watched the micro-modules, I had a more thorough understanding. That is, I knew about "A matches B" or "things could be explained in such way". Then I could develop some extended questions, which I could discuss with my teacher."

(Science, Year 1, 4.42)

Around half of the interviewees (47.1%) reported that the micro-modules did not influence their motivation on discussion with teacher.

"I don't think so. Perhaps my tendency is to focus more on the text, micro-modules provided me some supplementary knowledge which is beyond the text."

(Community Health Practice, Year 1, 18.44)

"Well, I don't see such an effect till now. It is because I think this KEEP modules mainly let me learn something new, something I did not explore before. If I had something I don't understand, whether in the micro-modules or in the texts, I would discuss with my teacher or ask him/her. If I had no questions after watching KEEP, I would not ask any questions."

(Science, Year 1, 9.102)

On written assignments

In this part, students were asked about whether watching micro-modules would have any influence on their paper writings. No student stated that the micro-modules have negative impact on their written assignments. 4 out of 17 interviewees (23.8%) reported that watching micro-modules had positive impact on writing reflective journal and term paper. The micro-modules contributed students' writing in two ways:

(i)   The micro-modules can supplement the students with relevant background information and explain related concepts of certain paper topics. This provides a more solid ground for students to construct their paper.

"When I wrote my reflective journal, I watched the videos on Newton again. That's why these videos gave me a strong impression. I thought the micro-modules supplement some background information, and helped us understand the key of the (reflective journal) questions, as our questions came from quotes of some scholars."

(Chinese Language and Literature, Year 2, 14.1)

"Yes, because those (micro-modules) were good for my term paper… The concepts of Yin, Yang and wu-hsing were different (from modern science). Even though the concepts were mentioned in the text, and also the additional reading, I think it is not enough for writing my term paper. I did not have a deep enough understanding yet."

<div align="right">(Science, Year 1, 9.20)</div>

(ii) The content of micro-modules can provide concrete examples and supporting evidences on related topics for students to construct and brainstorm their papers.

"Certainly (the micro-modules help with) my term paper… Especially for the topic on consciousness, I directly quoted an example mentioned in the micro-modules in my term paper. It mentioned that our brain could easily be influenced by external things… For instance, your brain may interpret that a picture is spinning but actually it was not really spinning, something like that… I copied the picture into my paper. [The student was then asked why the micro-modules are so useful.] I first encountered the topic of consciousness or freewill in UGFN. I initially had not much knowledge about these two big topics so it was quite difficult for me to find supporting evidence. I didn't know which example should be used to express my point of view. As micro-modules have described such a concept, I was more confident to (use the example to) support my idea."

<div align="right">(Business Administration, Year 2, 10.57)</div>

"I think watching micro-modules was mainly for brainstorming, because it provided something less relevant. But when you were writing a paper, you won't just use the material in the assigned texts. Listening to the other professors and the examples they used, I could have better brainstorming."

<div align="right">(Business Administration, Year 1, 5.60)</div>

On the other hand, 13 out of 17 interviewees (70.6%) claimed that watching micro-modules do not influence their construction on written assignments. The main reason is that most of the term paper topics are largely based on the content of textbook. Therefore, students usually construct their work by quoting relevant information from the assigned texts, rather than seeking extra information or example from other sources.

"Well, I think they may not help. Micro-modules may not specifically help us in writing. Because when the teacher designed reflective journal and term paper questions, I think he/she considered from the perspective of the texts instead of the micro-modules…"

<div align="right">(Economics, Year 1, 11.84)</div>

"No… When I wrote the term paper and reflective journal, I cited from the text content only. They [the micro-modules] were therefore not helpful."

<div align="right">(Insurance, Finance and Actuarial Analysis, Year 2, 17.74)</div>

"After all, reflective journal and term paper wanted to test our understanding of the meanings behind the text. Or say, the meaning of science…"

<div align="right">(Pharmacy, Year 1, 2.117)</div>

Other effects of watching micro-modules

The development of micro-modules aimed to provide basic knowledge for students to understand the text and relevant background or historical information for better attainment of the intended learning outcomes. Apart from that, some other positive effects are found from the interview with users.

(i) Learn scientific knowledge that is not directly related to the assigned text content.

"Yes. They [the micro-modules] are supplements. Perhaps the lecture time was too short. After the lecture, and before the tutorial, (I) could make use of the micro-modules to gain a better understanding. In other words, it supplemented and deepened my understanding."

(Social Science, Year 1, 1.18)

"Well… I think it works in two ways. Because a bunch of videos were available… there were around five or six clips (on Newton). Starting from velocity to first law, second law and third law, they actually contained some explanation at a professional level. On the other hand, they helped students with no prior knowledge to know more."

(Economics, Year 1, 11.74)

"I am not familiar with (the topic). Maybe at the beginning, I wanted to know more about DNA bonding and the history of DNA discovery. I wanted to gain more information in it. I can gain some chemistry knowledge and that is what the micro-modules could give me."

(Community Health Practice, Year 1, 18.74)

(ii) Help the students to recall the previously learnt scientific knowledge.

"I had studied Chemistry before, but I may need some revision in some of the topics."

(Community Health Practice, Year 1, 18.76)

"For Darwin's text, I watched (the micro-modules) for a while; it was about Biology. It refreshed my memory on studying Biology. I did not finish all of them because I found that I had already known those things."

(Biomedical Science, Year 1, 13.1)

(iii) Increase students' interest towards science related issues.

"Actually I am more motivated to watch some relevant documentary, something that is more related to daily life. In the micro-modules about the beauty of science, it gives me the impression that all the knowledge, that is the process of knowledge acquisition, was similar. Perhaps Physics, Chemistry and Biology possessed some common values, such as beauty of harmony. It could be applied on things in real life, so I think I am more motivated to watch (some relevant documentary)."

(Sociology, Year 2, 7.36)

(iv) Help the students to understand and appreciate Chinese science and medicine from

another perspective.

"A lot of people said that Chinese science was not science. But I don't quite agree, especially for Chinese medicine… People considered many things in Chinese medicine as not scientific because they judged them by western standard. However, these two things [Chinese and western sciences], as described in micro-modules, were actually from two different worldviews."

(Science, Year 1, 9.84)

"I think the micro-modules benefit more for students who did not know much about the theories mentioned in texts. Because I studied Physics before, I know what the micro-modules were about at first glance on the topics. I therefore did not watch them. But as I am a science student, I don't know much about Chinese medicine. I watched the KEEP modules on Chinese medicine. Because I had no prior knowledge in this area, so I think that they are very useful to me."

(Biochemistry, Year 2, 3.32)