

THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Scheme 1: Basic Scheme

Final Report (2017-18) (Additional Call)

Report due 31 October 2018

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

PART I

Project title: Articulation of Metabolic Pathways Using Articulate Storyline (Powerland)

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Other members of the Project Team: Ms Daisy CHEN, Mr NG Yat Nam

Department / Unit: School of Biomedical Sciences

Project duration: From March 2018 to October 2018

Date report submitted: 15 October 2018

1. Project objectives

Students always encounter difficulties in studying biochemical pathways. They are especially weak in understanding the relationships between metabolic pathways and their integration because these pathways are always taught one by one in class. This interactive courseware aims at arousing students' interest in learning electron transport chain and oxidative phosphorylation using the Articulate Storyline eLearning authoring software. The first three phases of the *Metabolism Metro* have been completed already. According to the feedback of the students, they all thought that the courseware helped their learning. Thus, Phase 4 of *Metabolism Metro*, Powerland (i.e. this project), was started in March this year. In this project, we have used animations to present abstract concepts as pre-class learning materials, and flashcards as post-class revision materials.

This project follows the original project objectives and most students think that the courseware helps them understand the course content better.

2. Process, outcomes or deliverables

Timeline of the project development:

Date	Phase	Activities
Project Phase		
Feb, 2018	Preparation	Setup the contents of the topic
Mar, 2018 - Aug, 2018 (<u>FINISHED</u>)	Preparation and development (1) – Powerland	- Development of courseware - Animation illustration setup - Graphics by Articulate Storyline
Aug, 2018 – early Oct, 2018 (<u>FINISHED</u>)	Preparation and development (2) – Revision mode	- Preparation of contents - Graphics by Articulate Storyline
Mid-Oct, 2018 (<u>FINISHED</u>)	Evaluation	Student surveys* (Previous students who have learnt the topic without the courseware will be invited to try the courseware. Their feedback will be included in the report and for further improvement of the courseware)
Mid Oct, 2018	Report Writing	Writing of the report
Post-Project Phase		
2018-19 Term 1	Dissemination	Launching the courseware for the class MEDU2600 Molecular Medicine and Genetics
2018-19 Term 2	Dissemination	Launching the courseware for the class SBMS1103 Biochemistry of Human Body

We have slightly modified our original plan and break the Powerland into 6 micro-modules and generated 6 animations for the students. The reason to have this change is because the concepts taught in this courseware are quite complex and it is difficult for the students to digest them all at one time. Instead, we have added a new component “tour guide” to guide the students walk around the courseware and give them an overall picture of the whole reaction, while adding 6 more animations (micromodules) to teach them the concepts one by one. Students are expected to use 10 min to understand each micromodule (animation + tour guide as explanation).

For the revision mode, 4 micromodules are produced (Laminolegoland, AG City, Sweetieland and Powerland revision flashcards). Students can revise what they have learnt in an interactive way by clicking on the metro map to magnify the region of interest. Information of each molecule (metabolite) are shown as metro station. They can study the chemical structures and functions of metabolites one by one, and to understand how those molecules link multiple pathways together. Students are expected to spend 15 min to study each set of flashcards (total: 4 sets of flashcards for 4 micromodules).

There is no major change in the deliverables and the project was completed satisfactorily.

3. Evaluation Plan

We have planned to do an online survey to collect students' feedback in late August. There is no major change in the evaluation plan. As the courseware will be launched in November 2018, we are unable to collect the students' feedback in this academic year. Instead, 14 students who have learnt the topic before were invited to try the courseware.

The courseware questionnaire contains 18 questions, 14 questions are related to the courseware utilization and students' satisfactory level on the courseware, and 2 open-ended questions in collecting their comments for improvement. The questionnaire is attached in Appendix 1.

All 14 students had filled in the questionnaire. Among these 14 students, 75% used the courseware 2-5 times, 25% of them tried 1 time only (Question 4). They all strongly agreed/agreed that the courseware:

- motivated them to learn by arousing their interest and curiosity towards the subject (Question 5).
- helped to improve their understanding of difficult concepts and (Question 6).
- helped them understand the course content better (Question 8)
- could highlight important concepts (Question 9)
- was attractive (Question 15)

They also think that (100% strongly agreed /agreed) the flashcards in the revision mode allowed them to recall the chemical structures and functions of different biomolecules, and to recall how biomolecules participated in multiple pathways (Questions 12-13).

86% of the students strongly agreed/agreed that the courseware allowed them to learn at their own pace (Question 7). 93% of them strongly agreed/agreed that the courseware was easy to use (Question 14). 86% of them strongly agreed/agreed that the Powerland facilitated their understanding towards the electron transport chain and oxidative phosphorylation, and the short animations enabled them to understand the pathways step by step (Question 10-11). In general, they were satisfied with the courseware (Question 16) (Appendix 2).

We also asked two open-ended questions. "What did you like most in the Powerland?" and "What could be improved in the Powerland?" We aim to collect feedback from students and can make modifications accordingly.

4. Dissemination, diffusion and impact

This project was started in March 2018. We have launched the trial version in late August and 14 students were invited to try the courseware. We wanted to release the trial version earlier so that we can have one month to fine-tune our courseware according to students' feedback before launching the courseware in November 2018 for the course MEDU2600 (target group: ~250 year 2 MBChB students) and March 2019 for the course SBMS1103 (target group: ~35 Year 1 Biomedical Sciences students).

This courseware will be integrated in the CU eLearning system (Blackboard). We have shared our courseware development in the poster sessions of the Teaching and Learning Innovation Expo 2016 and 2017 with positive feedback. Besides, our team was being invited to deliver a presentation on our project in the Canvas User Group Forum 2017 organized by the City University of Hong Kong. In May this year, we joined the eLearning Forum Asia 2018 in Taipei and shared our experience in the courseware development with teachers from other countries. The micro-modules in this courseware are suitable for all Biochemistry metabolism courses. We have finished Phase 4 of the Metabolism Metro and we will apply for more funding for the development of the remaining micro-modules. We hope that we can release the courseware to the public when the whole project is finished, so that students who are interested can learn biochemical pathways in an easy-to-understand manner.

PART II

Financial data

Funds available:

Funds awarded from MMCDG	\$ 41650
Funds secured from other sources (please specify _____)	\$ _____
Total:	\$ 41650

Expenditure:

Item	Budget as per application	Expenditure	Balance
Pre-production: content development and storyboard	7400	10840	-3440
Drawing, Animation and Interactive design	18500	14238	4262
Evaluation and amendments for animation	9250	9950	-700
Audio recording and room booking	2800	1440	1360
Post-production: course construction Presentation materials preparation	3700	5000	-1300
Total:	41650	41468	182

PART III

Lessons learnt from the project

Key success factors:

In this project, a few software was used, including Adobe Illustrator and After Effects for graphics design and animation production. Students like this kind of visual representation as this can give them an overall picture of the whole pathway and abstract concepts can be explain in a clearer manner using animations. Also, we tried to break the whole pathway into bite-size so that students can absorb the concepts easier bit by bit.

It might be an advantage for launching a trial version of the courseware and inviting students who studied the course previously as a focus group to try the courseware. Feedbacks were collected from students so that we can fine-tune the courseware according to their comments before we launch our real version to the students this year.

We would like to send our deep appreciation to colleagues from ITSC for their continuing support in this courseware, and their professional advices. This project is for sure unable to finish on time without their help.

Difficulties:

There has been no obvious obstacle during the production process. However, a student who participated in the evaluation commented that fluidity in the courseware can be improved as loading time was a bit long. We will continue to monitor the performance of SCORM object/HTML5 on Blackboard site.

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: Electron transport chain
 Keyword 2: Oxidative phosphorylation
 Keyword 3: Metabolism
 Keyword 4:
(Least relevant) Keyword 5:

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): https://blackboard.cuhk.edu.hk</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>

(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.

(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.

<u>Course Code/ Target Students</u>	<u>Term & Year of offering</u>	<u>Approximate No. of students</u>	<u>Platform</u>
<i>MEDU2600</i>	<i>1st term, 2018</i>	<i>250</i>	<i>Blackboard</i>
<i>SBMS1103</i>	<i>2nd term, 2019</i>	<i>35</i>	<i>Blackboard</i>

Table 3: Presentation (if any)

<i>Please classify each of the (oral/poster) presentations into one and only one of the following categories</i>	Number
(a) In workshop/retreat within your unit (e.g. department, faculty)	<i>NA</i>
(b) In workshop/retreat organized for CUHK teachers (e.g. CLEAR workshop, workshop organized by other CUHK units)	<i>NA</i>
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	<i>2 Poster presentations (Phase 1 and Phase 2 of this courseware)</i>
(d) In any other event held in HK (e.g. UGC symposium, talks delivered to units of other institutions)	<i>1 Oral presentation (Phase 1 & 2 of the project) (Canvas User Group Forum 2017 organized by the City University of Hong Kong)</i>
(e) In international conference	<i>1 Oral presentation (Phase 1 & 2 of the project) (eLearning forum Asia 2018)</i>
(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	NA
(b) Project leaflet	NA
(c) Project booklet	NA
(d) A section/chapter in a booklet/ book distributed to a limited group of audience	NA
(e) Conference proceeding	NA
(f) A chapter in a book accessible internationally	NA
(g) A paper in a referred journal	NA
(h) Others (please specify)	NA

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.

Students always encounter difficulties in studying biochemical pathways. They are especially weak in understanding the relationships between metabolic pathways and their integration because these pathways are always taught one by one in class. This interactive courseware aims at arousing students' interest in learning electron transport chain and oxidative phosphorylation using the Articulate Storyline eLearning authoring software.

In this project, the *Powerland* was developed as pre-class learning micromodules for students to go through and have some basic idea about electron transport chain and oxidative phosphorylation before class. This micromodules are presented as interactive animations. Besides, the *Revision mode* was designed as post-class revision micromodules. Students are expected to go through these micromodules during their revision after class. Students can revise what they have learnt in an interactive way by clicking on the metro map to magnify the region of interest. Information of each molecule (metabolite) are shown as metro stations. They can study the chemical structures and functions of metabolites one by one, and to understand how those molecules link multiple pathways together.

This interactive self-learning tool is packaged as a courseware using the Articulate Storyline eLearning authoring software.

Metabolism Metro (Powerland) Courseware Questionnaire (2018-19)

Aim of this project

Students always encounter difficulties in understanding abstract metabolic pathways as well as their integration. The *Metabolism Metro* was designed to facilitate students' learning of biochemical pathways. This courseware is a self-learning tool which aims to arouse students' interest in exploring human metabolic pathways. We would like to know what you think about the courseware. All information collected is for evaluation purposes only and will be kept in strict confidence.

Part A: Background

- What was your highest qualification achieved in secondary school?
IB DSE Others: (Please specify: _____)
- What is your highest academic qualification of Biology attained?
F.1/Grade 7 F.2/Grade 8 F.3/Grade 9 F.4/Grade 10
F.5/Grade 11 F.6/Grade 12 F.7/Grade 13
Others: (Please specify: _____)
- Have you ever used the courseware?
Yes No (This is the end of the questionnaire)
- How often did you use the courseware during the course?
1 time only 2 - 5 times 6 - 10 times More than 10 times

Part B: About the courseware

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5. The courseware motivated me to learn by arousing my interest and curiosity towards the subject.	⑤	④	③	②	①
6. The courseware helped to improve my understanding of difficult concepts.	⑤	④	③	②	①
7. The courseware allowed me to learn at my own pace.	⑤	④	③	②	①
8. The courseware helped me to understand the course content better.	⑤	④	③	②	①
9. The courseware could highlight important concepts.	⑤	④	③	②	①
10. The Powerland facilitated my understanding towards the electron transport chain and oxidative phosphorylation.	⑤	④	③	②	①
11. Short animations in the Powerland enabled me to understand the pathways step by step.	⑤	④	③	②	①
12. Flashcards in the revision mode allowed me to recall the chemical structures and functions of different biomolecules.	⑤	④	③	②	①

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
13. Flashcards in the revision mode allowed me to recall how biomolecules participated in multiple pathways.	⑤	④	③	②	①
14. The courseware is easy to use.	⑤	④	③	②	①
15. The courseware is attractive.	⑤	④	③	②	①
16. In general, I am satisfied with the courseware.	⑤	④	③	②	①

Part C: Open-ended Questions

17. What did you like most in the Powerland?

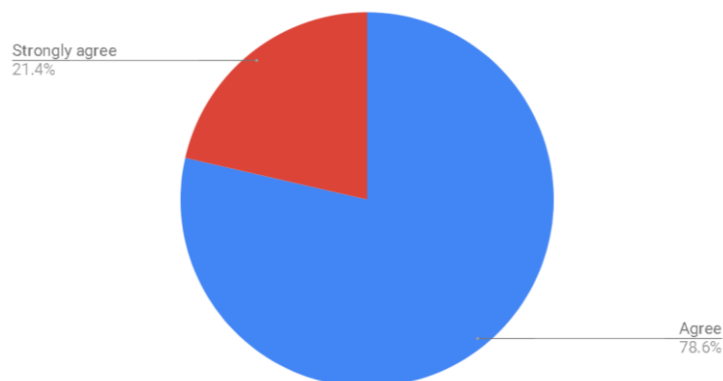
18. What could be improved in the Powerland?

- Thank You -

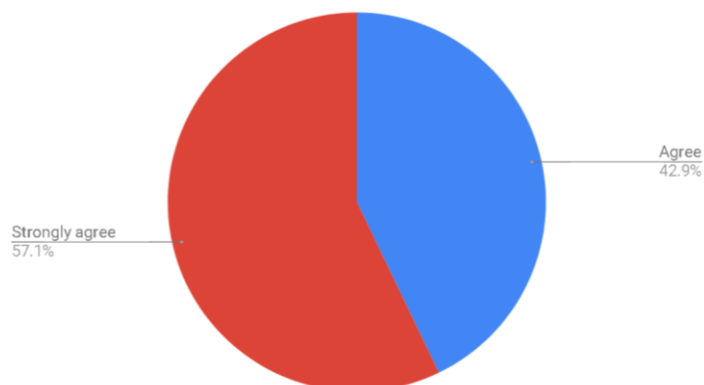
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Question 5

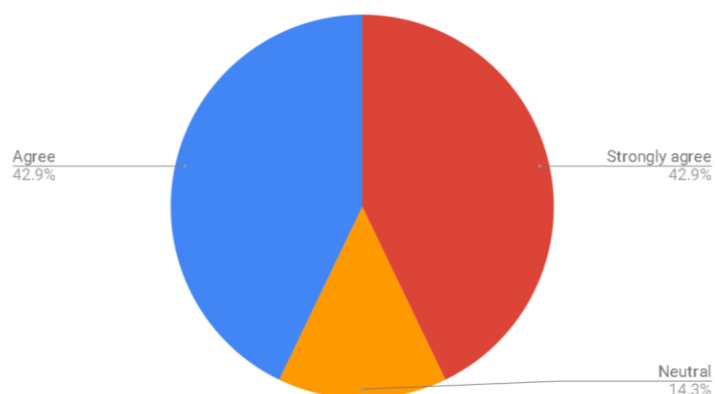
The courseware motivated me to learn by arousing my interest and curiosity towards the subject.

**Question 6**

The courseware helped to improve my understanding of difficult concepts.

**Question 7**

The courseware allowed me to learn at my own pace.



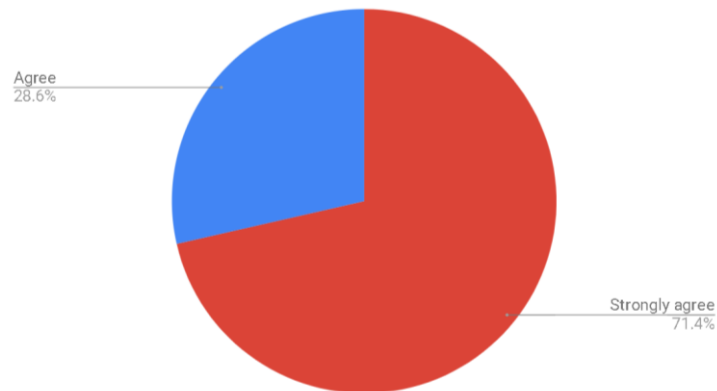
Question 8

The courseware helped me understand the course content better.



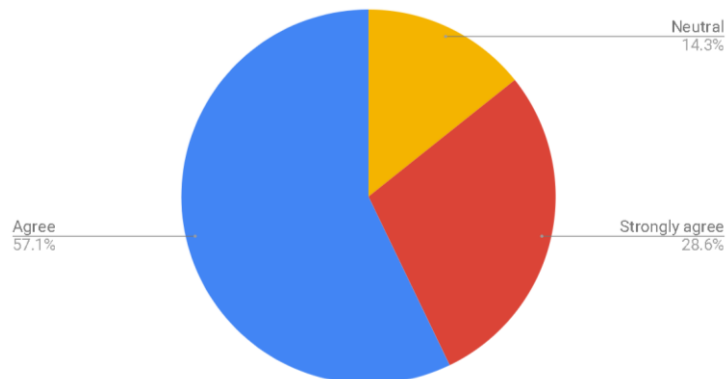
Question 9

The courseware could highlight important concepts.



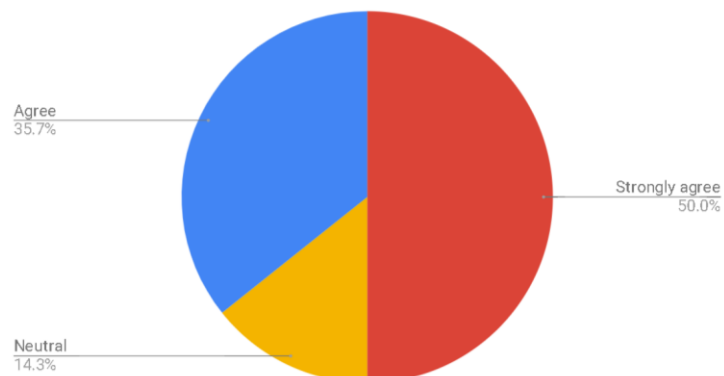
Question 10

The Powerland facilitated my understanding towards the electron transport chain and oxidative phosphorylation.



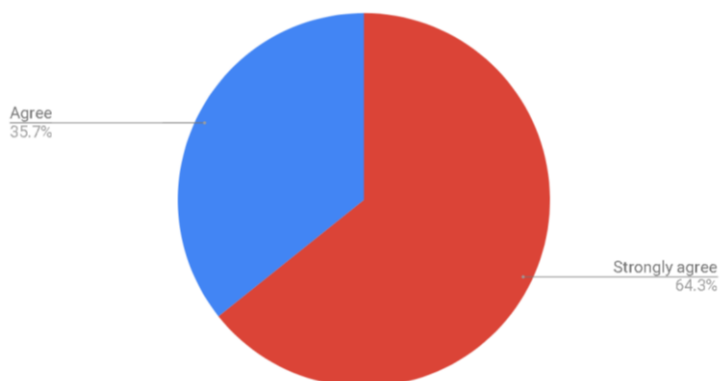
Question 11

Short animations in the Powerland enabled me to understand the pathways step by step.



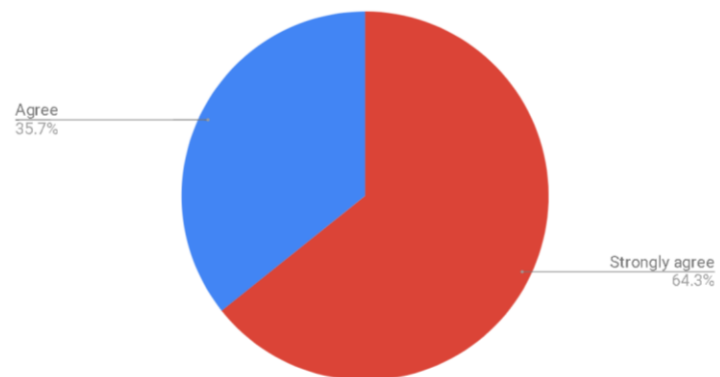
Question 12

Flashcards in the revision mode allowed me to recall the chemical structures and functions of different biomolecules.



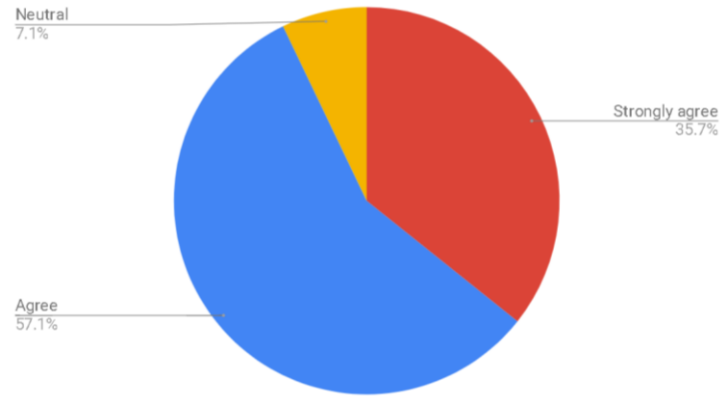
Question 13

Flashcards in the revision mode allowed me to recall how biomolecules participated in multiple pathways.



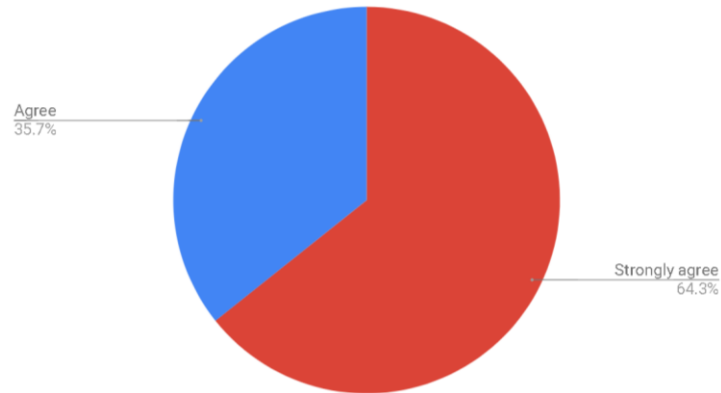
Question 14

The courseware is easy to use.



Question 15

The courseware is attractive.



Question 16

In general, I am satisfied with the courseware.

