THE CHINESE UNIVERSITY OF HONG KONG

Courseware Development Grant (2016-17)

<u>Final Report</u>

Report due 31 January 2018
Please return by email to Judy Lo judyl@itsc.cuhk.edu.hk

<u>PART I</u>

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

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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 February 2017 to January 2018

Date report submitted: 26 January 2018

1. Project objectives

Teaching biochemical pathways can be extremely challenging.   Students always encounter difficulties in understanding abstract metabolic pathways as well as their integration.   This interactive courseware aims at arousing students' interest in exploring human metabolic pathways using the Articulate Storyline eLearning authoring software. The first and second phases of *Metabolism Metro* have been completed already.   According to the feedback of the students, they all found it useful.   Thus, Phase 3 of *Metabolism Metro*, Sweetieland (i.e. this project), was started in Feb last year and this project was funded by the Courseware Development Grant Scheme 2016-17.   In this project, we have used new features like manga and mini-exercise to present abstract concepts in an easy-to-understand and interactive manner.   This interactive self-learning tool will be packaged as a courseware using the Articulate Storyline eLearning authoring software.

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

This courseware will be used in two courses: MEDU2600 Molecular Medicine and Genetics and SBMS1103 Biochemistry of Human body.

Timeline of the project development:

Date	Phase	Activities
Project Phase		
Mar, 2017	Preparation	Setup content of topics
Apr, 2017 - Oct, 2017	Preparation and development	- Development of courseware - Animation illustration setup - Graphics + narration by Articulate Storyline
Late Nov, 2017	First trial-run	Launching of the trial version for the class MEDU2600 Molecular Medicine and Genetics.
Early Dec, 2017	Evaluation	Collection of feedback from the students for further improvement of the courseware
Late-Jan, 2018	Report Writing	Writing of the report
Jan - Mar, 2018	Improvement	Courseware improvement
Post-Project Phase		
2017-18 Term 2	Dissemination	Launching the courseware for the class SBMS1103 Biochemistry of Human Body
2018-19 Term 1	Dissemination	Launching the courseware for the class MEDU2600 Molecular Medicine and Genetics

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

3. Evaluation Plan

We have planned to distribute hard copies of evaluation form (supplemented by online survey) to collect students' feedback on the courseware in mid-Nov to early-Dec. There is no major change in the evaluation plan. We do not collect any monitoring data for this courseware.

The courseware questionnaire contains 15 questions, 9 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.

88 students had filled in the questionnaire. Among these 88 students, 50 of them had used the courseware. 80% of the students strongly agree/agree that the courseware motivated them to learn by arousing their interest and curiosity towards the subject (Question 5). 71% of the students strongly agree/agree that the courseware helped to improve their understanding of difficult concepts

(Question 6).   85% of the students strongly agree/agree that the courseware allowed them to learn at their own pace (Question 7).   88% of the students strongly agree/agree that the courseware could highlight important concepts, and helped them understand the course content better (Questions 8 and 9).   78% of the students strongly agree/agree that the manga in the Sweetieland facilitated their understanding towards the pentose phosphate pathway (Question 10).   96% of the students strongly agree/agree that the courseware is attractive (Question 11).   84% of the students strongly agree/agree that the courseware is easy to use (Question 12).   In general, they are satisfied with the courseware (Question 13) (Appendix 2).

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

4. Dissemination, diffusion and impact

This project was started in February 2017.   We have launched the trial version in early November and students (course: MEDU2600 [1st semester of 2017], Year 2 MBChB students) were invited to try the courseware.   Feedback was collected from the students in late November to early December for improvements before launching the courseware in 2018 for the courses SBMS1103 (target group: ~35 Year 1 Biomedical Sciences students) and MEDU2600 (target group: ~250 Year 2 MBChB students).   The courseware is integrated in the CU eLearning system (Blackboard).   The advantage of incorporating the micro-modules in both semesters is that we can launch a trial run for student feedback collection in the first term, so that improvements can be made during the term break and the modified version can be launched in the second term.   This early student-feedback collection is very useful for project improvement in not only our project, but also projects in other disciplines as well.

We shared our courseware production in the Teaching and Learning Innovation Expo this year.   The micro-modules in this courseware are suitable for all Biochemistry metabolism courses.   We have finished Phase 3 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.

We had collected feedback from students in each project phase and made modifications accordingly. In this phase, we modified our courseware according to students' comment, such as increasing the speed of animations, using manga for explaining abstract concepts (Figure 1), and adding interactive exercise (Figure 2) to facilitate understanding.   Students like this interactive exercise as they can apply what they have learnt in class (last comment in Figure 3).
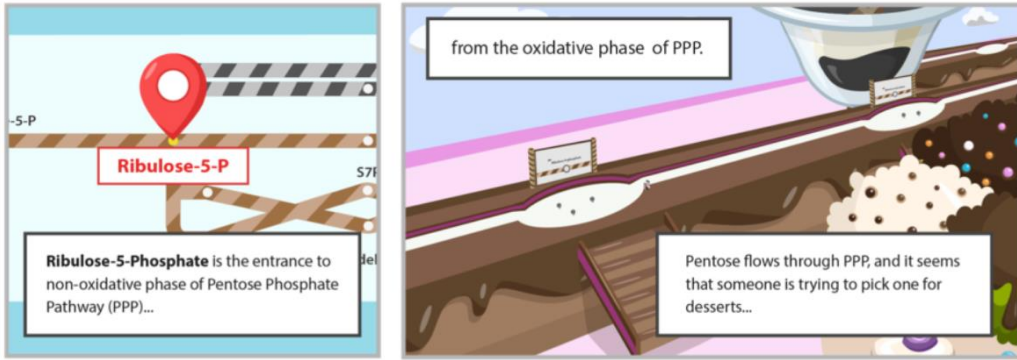
Figure 1: Presenting biochemical pathway using manga

Figure 2: "Mini-game" to facilitate understanding.

The design of the courseware is quite fun and relaxing.

The courseware has attractive pictures and relaxing music, and I prefer using it before lecture because I can get a clear mind on the pathway before learning in class.

I like how it regrates the pathways.

It is fun and stimulating.

Shows an entire map of the metabolic pathways and interaction of the different metabolism.
Clear explanation.

Good graphic design, adorable characters.

Animation

colour.

The design of the courseware is lovely, greatly enhancing my interest to revise for metabolic pathway.

help understanding

Cute idea invovling the metro system, will definitely use it once I start studying

The story as analogy to the pathways

Interesting way to learn boring metabolic pathways and molecules

It helps me to understand some difficult concepts better.

visualization of difficult concepts

I like the way to show the metabolism pathway in the courseware. It uses some lovely cartoon to show some reactions or enzymes[e.g. urea cycle]. I think it makes the reactions interesting and I can easily remember the function of the enzymes and how the reactions happen.

it's fun and relaxing!

beautiful design and the manga

The PPP part is the most interactive part. It doesn't merely show you what happens but allows you to participate in it so you can actively retrieve information from your brain but not just look at it as it goes. It's way better than the other parts in which you just see substance A becomes substance B and so on.

Figure 3.   Written comments from students responding to the question "What did you like most in the courseware." (Data obtained in Dec 2017)

PART II

Financial data

Funds available:

Funds awarded from CDG $ 29,400

Funds secured from other sources $ _____
(please specify_____)

                                Total: $ 29,400

Expenditure:

Item	Budget as per application	Expenditure	Balance
Content and animation development (including content development, animations, interactive design, integration and evaluation and amendments)	15400	15400	0
Project management (review and room booking, evaluation and amendments)	14000	14000	0
Total:	29,400	29,400	0

PART III

Lessons learnt from the project

Key success factors:

In this project, we have used Adobe Illustrator for drawing graphics to explain abstract concepts. Other courseware, including After Effects, and Camtasia were used as well. According to the feedback from the students, they think that this kind of visual representation is creative and the whole picture of metabolic pathway is presented in a clear and interactive manner. They think that the animations are attractive, and this courseware can motivate students' learning (Figure 3).

Another important factor is the early feedback collection from students. Feedbacks were collected from students in previous phases for project fine-tuning and addition of new components in the courseware, so that the "users" are actually involved in the design of the project. This can tailor-made a courseware that fit the needs of the students (end-users).

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

Difficulties:
We have used Articulate Storyline as the main tool for development. There are more interactive elements in this phase. So we have tested the SCORM via different browsers to make sure the buttons and interaction work well.

Students comment that they hope we can finish the whole project as early as possible because studying biochemistry pathway has always been viewed as the most boring and difficult part of biochemistry.   We have use 2 years for developing the first three phases of the courseware.   As we need to collect feedback from students at the end of each phase for improvement.   It takes some time for us to fine-tune our courseware and develop our next phase according to the need of the students.   We hope that the whole courseware can be launched in 2 years.

PART IV
Information for public access

Summary information and brief write-ups of individual projects will be uploaded to a publicly accessible CUHK CDG website. Please extract from Part I the relevant information to facilitate the compilation of the publicly accessible website and reports.

Teaching biochemical pathways can be extremely challenging.   Students always encounter difficulties in understanding abstract metabolic pathways as well as their integration.   This interactive courseware aims at arousing students' interest in exploring human metabolic pathways using the Articulate Storyline eLearning authoring software. This interactive self-learning tool will be packaged as a courseware and uploaded to the student learning platform (Blackboard).

1. Keywords

(Most relevant)   Keyword 1: Metabolism

Keyword 2: Carbohydrate

Keyword 3: Glucose

Keyword 4: Pentose phosphate pathway

(Least relevant)   Keyword 5:

2. Summary statistics

Table 1: Publicly accessible online resources (if any)
(a) **Project website: NA.**
(b) **Webpage(s):** https://blackboard.cuhk.edu.hk
(c) **Others (please specify):**

Table 2: Resource accessible to a target group of students (if any)			
Course Code/ Target Students	**Term & Year of offering**	**Approximate No. of students**	**Platform**
MEDU2600	*1st term, 2018*	*250*	*Blackboard*
SBMS1103	*2nd term, 2018*	*35*	*Blackboard*

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)	*NA*
(b) In workshop/retreat organized for CUHK teachers (e.g. CLEAR workshop, workshop organized by other CUHK units)	*NA*
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	*2 Poster presentations (Phase 1 and Phase 2 of this courseware)* *We plan to share this project in the CUHK Expo this year*
(d) In any other event held in HK (e.g. UGC symposium, talks delivered to units of other institutions)	*1 Oral presentation (Phase 1 & 2 of the project) (Canvas User Group Forum 2017 organized by the City University of Hong Kong)*
(e) In international conference	*Please insert no*
(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	*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 refereed journal	*NA*
(h) Others (please specify)	*NA*

Metabolism Metro Courseware Questionnaire (2017-18)

<u>Aim of this project</u>

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

1. What was your highest qualification achieved in secondary school?
   IB ○   DSE ○   Others: (Please specify: _____)
2. 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/Grade12 ○   F.7/Grade 13 ○
   Others: (Please specify: _____)
3. Have you ever used the courseware?
   Yes ○   No ○ (This is the end of the questionnaire)
4. 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 understand the course content better.	⑤	④	③	②	①
9. The courseware could highlight important concepts.	⑤	④	③	②	①
10. The manga in the Sweetieland facilitated my understanding towards the pentose phosphate pathway.	⑤	④	③	②	①
11. The courseware is attractive.	⑤	④	③	②	①
12. The courseware is easy to use.	⑤	④	③	②	①
13. In general, I am satisfied with the courseware.	⑤	④	③	②	①

<u>Part C: Open-ended Questions</u>

1. What did you like most in the courseware?

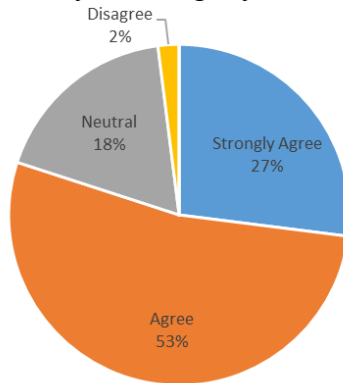

2. What could be improved in the courseware?

- Thank You -

Courseware Development Grant 2016-17
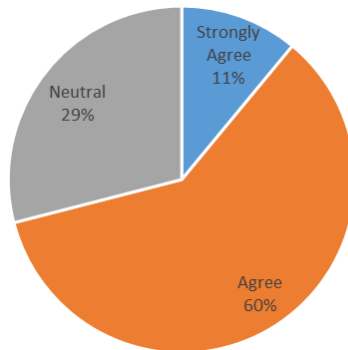**Articulation of Metabolic Pathways Using Articulate Storyline (Sweetieland)**

Question 5
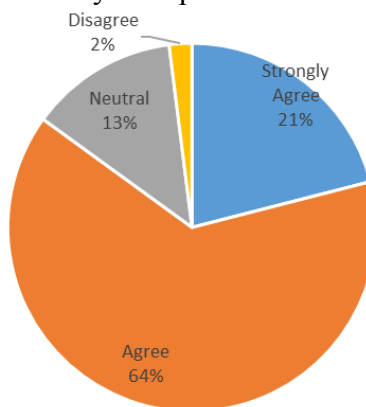The courseware motivated me to learn by arousing my interest and curiosity towards the subject.

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
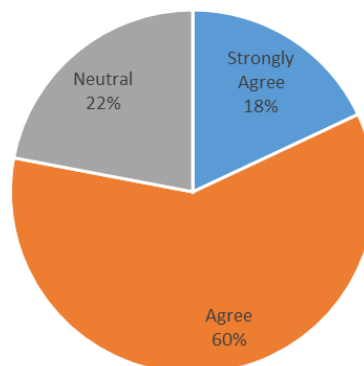The courseware helped me understand the course content better.
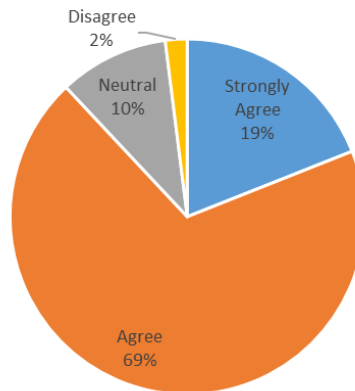
Question 9
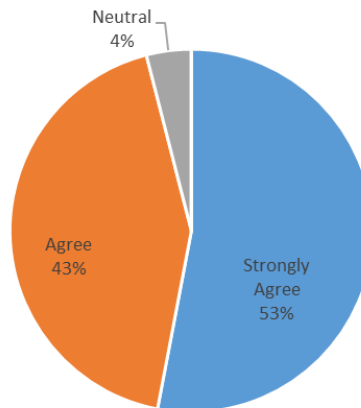The courseware could highlight important concepts.
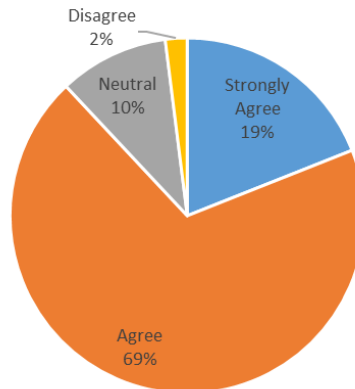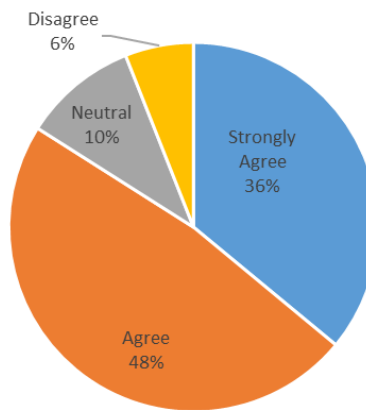

Question 10
The manga in the Sweetieland facilitated my understanding towards the pentose phosphate pathway.

Question 11
The courseware is attractive.

Question 12
The courseware is easy to use.

Question 13
In general, I am satisfied with the courseware.