Small TLEF Project – Final Report

Report Completion Date: (2017/06/15)

1. PROJECT OVERVIEW

1.1. General Information

Project Title:	**Enhancing cancer genetics education through participatory development of internet-based community education resources** (Project Reference: 14-085)		
Principal Investigator:	**Dr. Wyeth Wasserman**		
Report Submitted By:	**Dr. Wyeth Wasserman**		
Project Initiation Date:	**April 1, 2014**	**Project Completion Date:**	**Dec 31, 2016**

1.2. Project Summary

Amongst UBC students in the biomedical sciences, Medical Genetics 421 (Genetics and Cell Biology of Cancer) is one of the most highly sought courses. Motivated by personal experience or interest in medicine, the class attracts top students with commitment to excellence and community service. The students developed online resources for community education about cancer genetics. Working with mentors, the students created guides about genetic mechanisms of cancer and emerging technologies for DNA sequencing. The work extended into the summer, when a medical illustrator developed dynamic illustrations for the concepts described in the materials. The intern helped establish a process in which students collaborated with cancer genetics classes globally to extend the resource into an open-access compendium of educational materials. The work built on instructor expertise for the creation of award-winning open-access software and educational materials.

1.3. Team Members – *(Please fill in the following table and include **students**, undergraduate or graduate, who participated in your project).*

Name	Title/Affiliation	Responsibilities/Roles
Dr. Wyeth Wasserman	Executive Director, BC Children's Hospital Research Institute; Professor, Medical Genetics	Principal Investigator, and MEDG 421 Course Co-ordinator and Core Instructor
Puya Seid-Karbasi	Undergraduate Student, UBC (2011-2014)	Web-site Development
Cynthia XC Ye	MD PhD student, UBC	Project coordinator Graduate Research Assistant Teaching Assistant of MEDG 421
Allen Zhang	MD PhD student, UBC	Graduate Research Assistant
Nicole Gladish	Graduate student, UBC	Teaching Assistant of MEDG 421
Suzanne YS Cheng	Graduate student, UBC	Teaching Assistant of MEDG 421
Katharina Rothe	Graduate student, UBC	Teaching Assistant of MEDG 421
Jessica A. Pilsworth	Graduate student, UBC	Teaching Assistant of MEDG 421

Min A. Kang	CMMT intern (?)	Medical Illustrator
Natalie Doolittle	CMMT intern (?)	Medical Illustrator
Dr. Xiaoyan Jiang	Associate Professor, Medical Genetics, University of British Columbia	MEDG 421 Core Instructor
Peter C. Stirling	Assistant Professor, Medical Genetics, University of British Columbia	MEDG 421 Core Instructor
Catherin Pallen	Professor, Pediatrics, University of British Columbia	MEDG 421 Core Instructor
David Arenillas	Scientific Software Developer	Software Development

1.4. Student Impact – *Please fill in the following table with **past**, **current,** and **future** courses and sections (e.g. HIST 101, 002, 2017/2018, Sep) that have been/will be impacted by your project, including any courses not included in your original proposal (you may adapt this section to the context of your project as necessary).*

Course	Section	Academic Year	Term (Summer/Fall/Winter)	No. of Students
MEDG 421	001	2012-2013	Winter	39
MEDG 421	001	2013-2014	Winter	32
MEDG 421	001	2014-2015	Winter	24
MEDG 421	001	2015-2016	Winter	31
MEDG 421	001	2016-2017	Winter	30

2. PROJECT EVALUATION

2.1. Project Outcomes – *Please list the intended outcomes or benefits of the project for students, TAs and/or instructors.*

An open-access platform (CuboCube) for e-textbook creation has been finalized and contributed to the ongoing Open Educational Resources (OER) movement. The Cancer Genetics E-textbook has been edited and improved by additional students, and art works with CC BY-SA 4.0 license have been created for the e-textbook to illustrate key concepts, providing an invaluable resource to the science community. A paper was published in PLoS Biology (a leading journal) in 2017 to introduce the platform and the E-textbook to the community.

The Cancer Genetics E-textbook saved students of the MEDG 421 classes a total of (CA$227.35/book X 85 students) CA$19,324.75. Moreover, the direct participation in study material creation promoted understanding and greater interest in learning among students. Savings will continue to accrue.

Both the platform and the Cancer Genetics E-textbook are freely available to the global community. Such OER not only benefit other students who want to learn Cancer Genetics but also students, TAs and instructors who want to develop their own e-textbooks

2.2. Findings – *Briefly describe the methods and findings of your project evaluation effort: to what extent were intended project outcomes achieved or not achieved?*

- **Establishment of an open-access platform for e-textbook creation: http:/cubocube.com/**
- **Creation of online educational material about the genetic mechanism and cell biology of cancer:** A final e-textbook of 10 chapters with key cancer concepts.
- **Creation of scientific artwork depicting key cancer concepts**: 32 figures are created and shared under CC BY-SA 4.0 license.
- **Distribute the Open Educational Resources to the scientific community:** a paper was published in PLoS Biology

2.3. Dissemination – *Please provide a list of scholarly activities (e.g. publications, presentations, invited talks, etc.) in which you or anyone from your team have or intend to disseminate the outcomes of this project.*

- Seid-Karbasi P, Ye XC, Zhang AW, Gladish N, Cheng SYS, Rothe K, Pilsworth JA, Kang MAM, Doolittle N, Jiang X, Stirling PC, **Wasserman WW**, 2017, "CuboCube: Student creation of a cancer genetics e-textbook using open-access software for social learning", PLoS Biology, 15, e2001192. [Genome Canada, Genome BC, CIHR, NSERC, UBC Teaching and Learning Enhancement Fund (TLEF) and CFRI acknowledged] (PMID: 28267757; http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.2001192)
- Our full **web story** can be found here: http://bcchr.ca/news/news/2017/03/07/bc-children-s-hospital-researchers-ubc-students-create-their-own-e-textbook-and-new-software-platform
  - **Twitter** post: https://twitter.com/BCCHresearch/status/839209291668037632
  - **Facebook** post: https://www.facebook.com/BCCHResearch/posts/1320290141375199?match=YmMgY2hpbGRyZW4ncyBob3NwaXRhbCByZXNlYXJjaCBpbnN0aXR1dGUsYmMgY2hpbGRyZW7igJlzIGhvc3BpdGFsLGJjIGNoaWxkcmVuJ3MgaG9zcGl0YWwsaG9zcGl0YWwsYmM%3D
  - **Bit.ly to** Facebook post: http://bit.ly/2mCysUD

3. TEACHING PRACTICES – *Please indicate if **your** teaching practices or those of **others** have changed as a result of your project. If so, in what ways?*

During the development period the course directly incorporated the creation of the e-book as part of the curriculum. Students learned how to create content and use the software. As we move forward, the e-book has been stable and the amount of student modification required has decreased, so now the e-book is made available to students and they are encouraged to provide feedback within the tool. Like all learning materials in a rapidly moving field, there will need to be a substantial revision in the next 2 years, which will be incorporated into the curriculum in the 2017-18 school year.

4. **PROJECT SUSTAINMENT** – *Please describe the sustainment strategy for the project components. How will your work be sustained and/or potentially expanded (e.g. over the next five years)?*

The software was released to the community, providing a resource for the long-term access to the code. The lead students on the project have continued to provide support for the system (Puya Seid-Karbasi is now at Amazon, but remains engaged in supporting the tool; Xin Ye has entered the UBC MD-PhD program and is doing her PhD studies in our lab). For the next phase of development, we are seeking additional funding from the innovation sector to support refinement of the software and additional content creation. We would expect this funding to be available in the 2018 calendar year, providing another 3-5 years of sustained effort. Beyond that period, we will need to assess the state of the field and whether there is a reliable commercial tool that could replace the system.