TLEF Project – Final Report

Report Completion Date: (2021/12/31)

1. PROJECT OVERVIEW

1.1. General Information

Project Title:	Preparing Students for the Future of Digitalized Computer Numerical Control Fabrication with Multi-Media and Training Modules
Principal Investigator:	Vincent Leung
Report Submitted By:	Vincent Leung
Project Initiation Date:	2019
Project Completion Date:	Dec 2021
Project Type:	☐ Large Transformation ☒ Small Innovation ☐ Flexible Learning ☐ Other: [please specify]

1.2. Project Focus Areas – *Please select all the areas that describe your project.*

☒ Resource development (e.g. learning materials, media)

☐ Infrastructure development (e.g. management tools, repositories, learning spaces)

☒ Pedagogies for student learning and/or engagement (e.g. active learning)

☐ Innovative assessments (e.g. two-stage exams, student peer-assessment)

☐ Teaching roles and training (e.g. teaching practice development, TA roles)

☐ Curriculum (e.g. program development/implementation, learning communities)

☐ Student experience outside the classroom (e.g. wellbeing, social inclusion)

☐ Experiential and work-integrated learning (e.g. co-op, community service learning)

☐ Indigenous-focused curricula and ways of knowing

☐ Diversity and inclusion in teaching and learning contexts

☐ Open educational resources

☐ Other: [please specify]

1.3. Final Project Summary

Due to the impact of the COVID Campus closure, we were unable to ask our student team to come to campus to do the final recording / final video editing for the videos that we created for the projects. Thanks to the extension approval from Jeff Miller, Senior Associate Director, we were able to continue our projects and successfully created the educational videos by December 2021.

We were able to achieve more than our original proposal. In the original proposal, we planned to produce teaching modules for three machines at the Centre for Advanced Wood Processing (CAWP). 8-Axis Kuka Industrial Robotic work cell, 5 Axis CNC Processing Centre, and Artec 3D Digital Scanner. With the approval for Year 1 & 2 TLEF funding, we were able to create extra teaching videos with 5 Head Moulder and a Numerical controlled Table saw. These two pieces of equipment are used and taught in the junior year within the undergraduate degree program of Wood Products Processing (WPP). Therefore, the teaching modules created from this TLEF funding can benefit both junior and senior-level students within the WPP program.

The modules have been used to enhance the teaching and learning for three of the WOOD courses, laboratory work, and students at the co-op for the Undergraduate Wood Products Processing Program (WPP) and the Graduate study and research for the Department of Wood Science. The material includes machine operation instructions, software programming, and glossaries presented in online video format.

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

Name	Title/Affiliation	Responsibilities/Roles
Vincent Leung	Associate Professor of Teaching	Supervisor
Joseph Kim	Graduate Student	Video Recording / Editing
Lukie Leung	Graduate Student	Video Recording / Editing
Lara Damen	WPP undergraduate student	Voice Over

1.5. Courses Reached – *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 reached by your project, including 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)
WOOD 305	101,102	2021/2022	Summer (May)
WOOD 290	101	2021/2022	Winter (Jan)
WOOD 482	101	2021/2022	Winter (Jan)
WOOD 305 (WOOD 449A)	101	2020/2021	Summer (May)

2. OUTPUTS AND/OR PRODUCTS

2.1. *Please __list__ project outputs and/or products (e.g. resources, infrastructure, new courses/programs). Indicate the current location of such products and provide a URL if applicable.*

Product(s)/Achievement(s):	Location:
UBC Centre for Advanced Wood Processing - Altendorf Sliding Table Saw Saw Blade Changing	https://www.youtube.com/watch?v=H54BGLr3DHk
UBC Centre for Advanced Wood Processing - Weinig Moulder Powemat Machine Overview	https://www.youtube.com/watch?v=OY4DKBMo4zQ
UBC Centre for Advanced Wood Processing - Weinig Moulder Powemat Basic Operation	https://www.youtube.com/watch?v=P-SYFJpXZM4&t=85s
UBC Centre for Advanced Wood Processing - Kuka Robot Basic Operation Demo - Table Top Machining	https://www.youtube.com/watch?v=2i56doe7rt4
UBC Centre for Advanced Wood Processing - Homag 5-axis CNC Router Manual Movement	https://www.youtube.com/watch?v=oM3buLmRhZ0
UBC Centre for Advanced Wood Processing - Homag 5-axis CNC Router - Basic Operation	https://www.youtube.com/watch?v=y012tllL2Jg
UBC Centre for Advanced Wood Processing - Artec Scanner Tutorial - Model Cleaning Instruction	https://www.youtube.com/watch?v=PLc_i8X8rUw
UBC Centre for Advanced Wood Processing - Artec Scanner Tutorial - Scanning Instruction	https://www.youtube.com/watch?v=G490MDszd10&t=26s

2.2. Item(s) Not Met – *Please list intended project outputs and/or products that were not attained and the reason(s) for this.*

Item(s) Not Met:	Reason:
we were thinking of using videos to create learn modules	Running out of time. The "module" idea can be done by the individual instructor under their courses' lecture slide/presentation or Canvas website.

3. PROJECT IMPACT

3.1. Project Impact Areas – *Please select all the areas where your project made an impact.*

☒ Student learning and knowledge

☒ Student engagement and attitudes

☐ Instructional team-teaching practice and satisfaction

☐ Student wellbeing, social inclusion

☐ Awareness and capacity around strategic areas (indigenous, equity and diversity)

☐ Unit operations and processes

☐ Other: [please specify]

3.2. What were you hoping to change or where were you hoping to see an impact with this project? – *Please describe the intended <u>benefits of the project</u> for students, TAs, instructors and/or community members.*

With the development of the tutorial modules, students, both undergraduate and graduate, will be able to understand and get familiar with the new technology quickly, and will better understand the capability and potential applications for the technology. With the material, students are not relying on technicians or instructors to provide the basic training. They can study the material at their own pace. Especially, some international students tend to learn slower because of language barrier. This will enable more of our students to gain experience using these advanced technologies without potential hazard. The learning curve for the students for the new technology will be shorter as there will be proper training material with step by step instructions. The documents will be structured in different progression levels (basic to advanced) so that students may choose the level of complexity based on their objectives. This project is focusing on advanced digital and complex industrial machines which do not have formal instructional manuals for these specific machines. The material will provide instructors and technicians with a formal training document that will ensure consistency in training the students on correct and safe operation. Potential workshops and events can be offered to the students and industry guests. The student team, funded by this project, will serve as leaders for these events. Events of this type can be used to gauge student interest in the area of Digital Wood Fabrication Technology.

3.3. Were these changes/impacts achieved? How do you know they occurred? – *How did you measure changes/impacts? (e.g. collected survey data, conducted focus groups/interviews, learning analytics, etc.) Describe what was learned from this process. You are encouraged to include copies of data collection tools (e.g. surveys and interview protocols) as well as graphical representations of data and/or scenarios or quotes to represent and illustrate key themes.*

We were able to use most of the videos in the past terms (some of them were not the final version as the COVID closure and moved to online teaching which these videos were very useful) for our teaching and demonstration. We asked a few faculty members and the technical staff to provide us feedback, and they were all come back positive as it will help the teaching. We did not have the resource and enough time at the end of the project (due to COVID) to create any survey or analytics for feedback. However, we did show the videos to some of the senior students who learned the material before, and their feedback was positive; for example:

- Detailed videos will good amounts of information within reasonable short videos,
- Good technically information from the videos,
- Material in the videos are easy to understand, memorable and comprehensive,
- Students can access the videos on the class Canvas site at any time,
- Professional videos with all the proper lighting,
- Good demonstration of the machines,
- One of the videos has a good case study to engage deeper thinking and understanding

3.4. Dissemination – *Please provide a list of __past__ and __upcoming__ scholarly activities (e.g. publications, presentations, invited talks, etc.) in which you or anyone from your team have shared information regarding this project. Be sure to include author names, presentation title, date, and presentation forum (e.g., journal, conference name, event).*

N/A – only sharing the links to the faculty and staffs within our department so that they can use it whenever seems fit:

Jason Chiu – Managing Director of CAWP

Joern Detter – Assistant Professor of Teaching

Robert Fuerst – Associate Professor of Teaching

Brandon Chan – Technical Operations Manager

Lief Eriksen – Manufacturing Lab Facilities Supervisor

Claudia Ediger – Machine Lab Technician

4. **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. Do you see these changes as sustainable over time? Why or why not?*

We were showing the videos during classes (both in-person and online) in the past terms. During the online teaching only period, these videos were very useful as we do not have access to the physical equipment to do demos or exercise. Therefore, we would use the videos and the online lectures to deepen the relationship between the theory and practical concepts together. For this term, the videos were used for the in-person lecture which is a very useful tool to show the students what they need to pay attention to when they physically work and use the equipment.

5. **PROJECT SUSTAINMENT** – *Please describe the sustainment strategy for the project components. How will this be sustained and potentially expanded (e.g. over the next five years). What challenges do you foresee for achieving the expected long-term impacts listed above?*

WPP students and graduate students have requested to be able to learn and use the new digital wood fabrication equipment at CAWP to carry out design and fabrication projects. After discussion with the students individually, students recommend more learning opportunities are needed. The videos will continue to be used for courses in our programs. We might need to create more videos if we can continue seeing the benefits and positive feedback in the future. The benefits of such a project will be experienced by all users (undergraduate, graduate, instructors, staff, and industry), for many years to come.