TLEF Project – Final Report

Report Completion Date: (2026/03/03)

1. PROJECT OVERVIEW

1.1. General Information

Project Title:	Developing interactive learning modules for hands-on-econometrics skills		
Principal Investigator:	Jonathan Graves, Assistant Professor of Teaching, VSE Marina Adshade, Assistant Professor of Teaching, VSE Emrul Hasan, Lecturer, VSE		
Report Submitted By:	Jonathan Graves		
Project Initiation Date:	April 2022	**Project Completion Date:**	Dec 2025
Project Type:	☒ Large Transformation ☐ Small Innovation ☐ UDL Fellows Program ☐ Hybrid and Multi-access Course Redesign Project ☐ 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 – *What did you do/change with this project? Explain how the project contributed toward the enhancement of teaching and learning for UBC students.*

At UBC, all economics students take several courses in applying economic theory and models to data using statistical methods (econometrics). Many students struggle to engage with this material, particularly when it comes to practical applications and hands-on experience, putting them at a disadvantage following graduation or in more advanced courses. This project addressed this challenge by creating a collection of hands-on modules designed around best practices for teaching statistics. These modules, focused on economic questions, models, and data, use interactive notebook-based technologies (Jupyter) to synthesize analysis, discussion, and conceptualization into a single learning experience – appropriate for either laboratory or flipped classroom instruction. This project also improved accessibility, by lowering costs and hardware requirements for students, and created a library of open educational resources for broader instructional needs.

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
Jonathan Graves	Associate Professor of Teaching / VSE	Principal Investigator
Marina Adshade	Associate Professor of Teaching / VSE	Principal Investigator
Emrul Hasan	Lecturer / VSE	Principal Investigator
Nina Hewitt	Associate Professor of Teaching / GEOG-Hewitt Lab	Author, Developer
Laura Nelson	Associate Professor / SOCI-CCSS	Author, Developer
Colby Chambers	Student	Research Assistant
William Clinton Co	Student	Research Assistant
Paul Corcuera	Student	Research Assistant
Rathin Dharani	Student	Research Assistant
Anneke Dresselhuis	Student	Research Assistant
Colin Grimes	Student	Research Assistant
Yeow Chong Goh	Student	Research Assistant
Jonah Heyl	Student	Research Assistant
Arshiya Malik	Student	Research Assistant
Shiming Wu	Student	Research Assistant
Oliver Xu	Student	Research Assistant
Valeria Zolla	Student	Research Assistant
Jasmine Arora	Student	Research Assistant
Angela Chen	Student	Research Assistant
Priyanshu Mahey	Student	Research Assistant
Mridul Manas	Student	Research Assistant
Sarthak Kwatra	Student	Research Assistant
Giulia Lo Forte	Student	Research Assistant

Kady Toure Yeo	Student	Research Assistant
Charlotte White	Student	Research Assistant
Irene Berezin	Student	Research Assistant
Eric Daigle	Student	Research Assistant
Alex Haddon	Student	Research Assistant
Jane Platt	Student	Research Assistant
Priyanshu Mahey	Student	Research Assistant
Luiz Felipe Ramos	Student	Research Assistant
Avi Woodward-Kelen	Student	Research Assistant
Uddhav Kalra	Student	Research Assistant
Nathan Zhang	Student	Research Assistant
Cheryl Wu	Student	Research Assistant
Shihan Chen	Student	Research Assistant
Wuyang Ren	Student	Research Assistant
Theo Teguh	Student	Research Assistant
Siena Serikawa	Student	Research Assistant
Philip Solimine	Postdoctoral Fellow / VSE	Consulting faculty
Florian Hoffman	Associate Professor / VSE	Consulting faculty
Paul Schrimpf	Associate Professor / VSE	Consulting faculty
Peifan Wu	Postdoctoral Fellow / VSE	Consulting faculty
Shameem Chowdhury	Sessional Instructor / VSE	Consulting faculty

1.5. Courses Reached – *Please fill in the following table with **past** and **current** courses (e.g., HIST 101, 2017/2018) that have been 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	Academic Year
ECON 326	2022-Present
ECON 490	2022-Present
ECON 398	2022-Present
ECON 227	2023-Present
SOCI 280	2024-Present
SOCI 508	2024-Present
GEOG 374	Intermittent
ECON 325	Intermittent
ECON 226	2023-2024

2. OUTPUTS AND/OR PRODUCTS

2.1. *Please **list** project outputs and/or products (e.g., resources, infrastructure, new courses/programs). Indicate a URL, if applicable.*

Output(s)/Product(s):	URL (if applicable):
COMET Website	https://comet.arts.ubc.ca/
COMET Repository	https://github.com/ubcecon/comet-open
Learning Modules	https://github.com/ubcecon/comet-open/tree/main/project/docs
Development Resources and Guides	https://github.com/ubcecon/comet-open/tree/main/project/pages

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

Item(s) Not Met:	Reason:
None / Not applicable	N/A

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-satisfaction

☐ Teaching practices

☐ Student wellbeing, social inclusion

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

☐ Unit operations and processes

☐ Other: [please specify]

3.2. Please provide details on each of the impact areas you selected in 3.1. – *For example, explain in which ways your teaching practices changed; how student wellbeing was impacted; how students wellbeing benefited from your project, etc.*

This project was a knowledge creation project, and while there likely are ancillary benefits to student motivation and attitude towards learning applied econometrics, we were more interested in their learning. Our project has significantly changed both the content and the learning activities in the targeted courses, alongside other *ad hoc* uses by students outside of coursework. Students now learn applied econometrics in a way which is more realistic and accessible. They also have the opportunity to choose from instruction in two different languages (R or STATA), to suit their learning goals. The improved curriculum and pedagogy created by our econometrics modules has deepened student learning and made teaching more flexible and simpler for instructors.

3.3. How do you know that the impacts listed in 3.1/3.2 occurred? – *Describe how you evaluated changes/impacts (e.g., collected survey data, conducted focus groups/interviews, learning analytics, etc.) and what was learned about your project from the evaluation. You are encouraged to include graphical representations of data and/or scenarios or quotes to represent and illustrate key themes.*

General Effectiveness

(n = 17)	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
I think the modules helped me **learn how to code**	23.5%	29.4%	23.5%	17.6%	5.9%
The modules were a **helpful study tool** in the course	0%	64.7%	5.9%	23.5%	5.9%
Overall, the modules helped **improve my understanding of applied econometrics**	17.6%	58.8%	0%	17.6%	5.9%
The **instructions and explanations** in the notebooks **were clear**	0%	35.3%	35.3%	23.5%	5.9%
Modules like this **should be used in other ECON courses**	23.5%	47.1%	17.6%	5.9%	5.9%

(n = 17)	Too easy	Somewhat Easy	About Right	Somewhat Difficult	Too Difficult
How did you find the **overall difficulty of the modules?**	5.9%	17.6%	47.1%	29.4%	0%

During the project, we conducted a series of surveys and focus groups. We used these to identify areas to improve the modules, and to quantify the impacts. You can see an example in the table above. We learned that the most important factors in creating effective modules were (i) modules that has no errors, issues, or potential bugs, and (ii) clarity of writing. During the project, we trained our RAs and team members to focus on these areas, to improve the materials. This has since informed our work on subsequent projects, as we outline in Section 5.

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?*

   Our project was intended to be used in the classroom or lab, and we have been successful at integrating it into several courses at UBC. Each module in the project can be used in several ways, but currently we use them:

   - As stand-alone self-study materials, for students needing a refresher in upper-level courses.
   - In classroom instruction, where students work through a module, or series of modules with instructor support.
   - In lab instruction, where a TA helps students as they work through a module, or in a "flipped lab" format, where the students do the lab in advance, then the TA demonstrates key skills on another dataset.
   - In seminars and workshops, where we teach faculty or students how a specific tool or econometric idea works, usually modeled after classroom instruction.

We see these changes as both positive intended outcomes of the project, and something that will be sustainable over time. Our library of materials will continue to cover essential materials for these courses, and will support instruction of different types in the future.

One possible change is the impact of generative AI coding tools; it is likely in the future that our modules will be increasingly easy for students to work through on their own, as software tools integrate better AI support for novice users. This will mean that instructor or TA support will be less-necessary, making the materials more capably used in a flipped-classroom environment – especially once students are comfortable with the tools.

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 project sustainment?*

   We designed our project to be very sustainable. It uses open-source tools, and publicly available resources which are available on our project website (above). We also curated the software and tools the project uses, so that working versions are tracked, updated, and continue to be usable, even as the tools and software change. We also developed tools that automate the process of updating the teaching resources and platform, and it requires only a small amount of time to refresh, update, or add new resources. Since the teaching resources, materials, and software are static and open sourced, hosted on mainstream, public, repositories, we see no challenges with sustainment in the future.

   Our project has also since been expanded. During the project, generative AI tools became mainstream, and other teams at UBC built on our work to create notebooks and materials to teach students about these tools. You can see these here: https://ubcecon.github.io/praxis-ubc/

6. **DISSEMINATION** – *Please provide a list of 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). These will be included on the TLEF scholarly output page.*

- M. Adshade, J. Graves, E. Hasan. *COMET: Developing interactive learning modules for hands-on-econometrics skills*. TLEF Showcase. 2023. Conference.
- M. Adshade, J. Graves, E. Hasan. *COMET: Developing interactive learning modules for hands-on-econometrics skills*. 2024 TLEF Showcase. Conference.
- M. Adshade, J. Graves, E. Hasan. *Using Jupyter to Teach and Assess Econometrics*. CTALE TeachECONference. 2024-06-19. Conference.