

COMET: Developing interactive learning modules for hands-on-econometrics skills

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Introduction

All economics students take several courses in applied statistical methods for economics (*econometrics*). Many students struggle 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.

Surveys of students indicated that after completing these courses:

- Few felt ready to do applied research
- A majority lacked confidence with using applied tools and modelling
- A large minority had no experience using statistical software or applying econometrics

These experiences tracked with those of faculty who reported students struggled to apply economic tools, and lacked fundamental skills in econometrics which the Vancouver School of Economics (VSE) has identified as key learning and program outcomes.

Our TLEF: COMET

The goal of this large TLEF project, which we dubbed “COMET” (for *Creating Online Materials for Econometrics Teaching*) is to address these gaps 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.

Module Design

Our modules cover specific topics from our core econometrics courses. Each typically includes:

- An open-source dataset, from real-world sources like the Census of Canada.
- A Jupyter Notebook which outlines the topic and guides students through applying the technique to the data.
- A set of interactive and reflective exercises students perform as they move through the notebook, which provide feedback or provoke deeper thinking.

Notebooks are formatted for either independent or guided study in several modalities, including flipped classroom, lab, or in-class exercises.

- All our material is open-sourced under a CC-by-NC 4.0 licensed and is free to use

Jupyter Notebooks

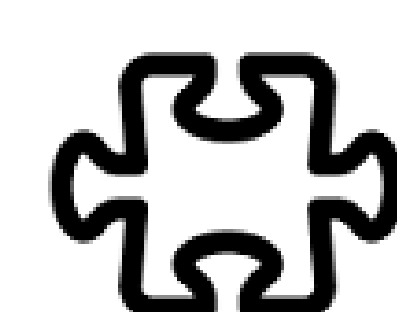
Our approach is based on Jupyter notebooks, which are a modern and proven pedagogical tool for teaching applied statistics. Notebooks have several key benefits:

- They are language agnostic, allowing us to support several statistical languages in the same widely-supported framework
- They support “literate computing” which interleaves discussion, reflection, and computation
- They can be run via the cloud, in a web-browser, abstracting away from computer hardware or software requirements

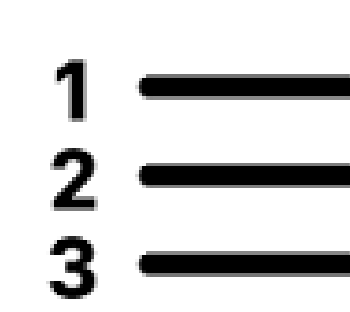
The last point is particularly since it means students do not need special software or a good computer to use statistics. It also means the tool is easier to integrate with assistive technologies which work with web-browsers.

Year 1: Kickstarting the Project

Our project has completed 1 year of development, and has been very productive:



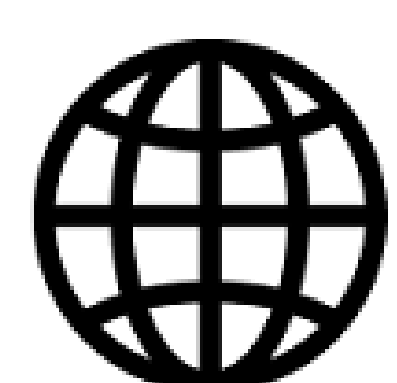
Developed
55
modules



Written
102,124+
lines of code



Created
380+
git commits



Created
1
platform



Employed
12
students



Reached
6+
courses

- We also estimate that it saved students \$90,000+ dollars relative to buying a STATA license for some of the core targeted courses.

Website and Main Resource Library

We created an open-source library of our tools and resources which students can read, or can launch the Jupyter notebooks using one of our pre-defined hubs.

Try it yourself at <https://comet.arts.ubc.ca/> or by scanning the code below.



Next Steps

We are currently starting our second year, and our priorities include:

- Collecting and evaluating student feedback from year 1 courses and focus groups
- Improving existing modules to be more compartmentalized and easier to use
- Expanding to additional courses and languages based on curricular needs
- Improving the infrastructure for the project
- Integrating more assessments and tools for assessment into the project

We are also working to extend the tools beyond economics as part of COMET+ where we have brought on faculty from Geography, Sociology, and the Centre for Computational Social Science.

- We are also exploring the students-as-partners framework as a tool for continual development post-TLEF

Interested? Get Involved!

As part of our project we are interested in helping students and faculty using computational tools and statistics learn more about these kinds of frameworks, and their use in classrooms or research, and are happy to help support you.

- We offer workshops, advice, and support
- Get in touch via comet.project@ubc.ca

Acknowledgements

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