How to Successfully Integrate Research into Teaching: My Experience from Teaching in the US, Bulgaria, Hungary, Germany, and the UK

CTaLE Webinar, March 6, 2024

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The Problem: The UG-PGT/PGR (research) "discontinuity"

- These days, one needs a PhD to teach Economics at a university level. Most of the universities, however, are teaching-oriented.

- US is the country with the best PhD training (focusing on top 40 unis), followed by Western European ones

- Many of the US PhD students do not have previous Economics degrees, may spend the PGR years as RAs (TAs at least learn to teach basic economics and/or statistics). Also, teaching Principles is taken as a "chore," as being "too low-brow" …

- Good theory students proceed to top academic employments (research universities, research centres, Central Banks), spend time mostly doing research, and some advanced teaching. No interaction with undergraduates.

- Especially, "mid-range" theorists are the ones that are usually considered "out-of-luck"…

- [Another tendency observed is for PhD topics these days to be more and more on the applied side, especially if industry jobs is sought.]

- However, those "geeky" PhDs might have certain comparative advantage in academia (at undergraduate level), especially if they invest in "technical" pedagogy, as there is need for "teaching scholars" in economics.

- As those academics will mostly teach undergraduate students (here the focus is on teaching Principles), those instructors have the advantage of being able to follow the newest developments in theory (and do some attempts at modern scholarly work), and try to digest those results, and feed them back to the students.

- Also, identify which bits and pieces of technical (maths/stats/theory) knowledge are crucial for later, more complex issues.

- The objective is to provide a bridge to PG level, and solve the "discontinuity" problem – which is "water down everything at UG level, keep it non-technical", then "push PRGs as much as possible, as they are well-trained technically already" ☺

- Lastly, teaching (which?) macroeconomics consistently – problem due to the existence of different schools of thought…The New Neoclassical Consensus?

At Year 1 Level (in Principles module)

- Cover the concepts – important for students to immediately get their hands on data. At the University of Lincoln, we have a Bloomberg suite. We also have the LSMIF (research + trading).

- How are certain things measured (read the methodology doc) – GDP, inflation, unemployment, (nominal and real) interest rate, etc. What the indicators show, and what they do not. What are the assumptions used. Making proper inference: GDP vs well-being, etc

- Example: I had a student who could recite by heart the textbook definition for "what is money", but had no idea how to measure it – i.e, which monetary aggregate(s) to look at. Mapping definitions to empirics/measurement should therefore start from week 1. Students should engage with statistical websites (Bloomberg, Data Stream), transforming data, plotting. "Getting their hands dirty, hands-on" – note this is pre-econometrics (heavy machinery is not a substitute to clear thinking)

- In addition, in macroeconomics it is crucial to reinforce that data needs to be in real terms ("real purchasing power") – once in a while, a last year student would ask if in their UG dissertation, GDP should be in current or constant prices…

- At the American University in Bulgaria (AUBG), US-style private university in Bulgaria: Best students offered to serve as tutors in their Y2, Y3, Y4 – helpers, mark a small component (quiz, HW sets), "buddy system" – hold informal office hours – some were paid via Student Services scheme.

- Alternatively, hire a student who did very well in UG Econometrics as a "research assistant" – still require a lot of guiding and hand-holding…Also, tend to be close to graduation – so busy with their own modules, etc.

Year 1: Simple Research Projects (Glasgow U)

- It is doable (and has been done at the University of Glasgow 09-13) to have an individual/group module project at Year 1. Possible topics assigned were

- Calculating a student's CPI

- Computing and analysing the "misery index" (inflation and unemployment rate) of a country

- Analysing growth performance of a country, and/or compare and contrast exercise

- Compare and contrast 2 crises from different time periods

Y1: "Luring" Students into Research via Gamification in Micro Principles

- Beside work with data, what about models (and numerics)?

- - Micro – mostly static, using diagrams. But also some hidden dynamics: introduce via "gamification approach" (*press the button and observe*) multi-period interactions, also important to introduce the notion of "convergence" in finite environment. How things work (at AUBG, work with COS students to program these setups)

- – arriving to steady-state equilibrium in supply-demand (possible behavioural foundations, learning, bargaining/haggling interactions, game theory setups)

- - Long-Run Equilibrium with Perfectly Competitive Firms (with free entry and exit) – importance of assumptions

- - Long-Run Equilibrium with Monopolistically-Competitive Firms (with free entry and exit)

- Textbooks show "before and after" – some students realize "the middle is missing" (which is the interesting part). At Lincoln, in Y1, we teach difference equations, solvable in Excel, so some simple dynamics is introduced in the maths module.

Y1: Gamification in Macro Principles (Bulgaria and Lincoln)

- Macro: The Keynesian (cross) model, monetary and fiscal policies; AS-AD model in the SR and LR

- *Bulgarian Minister of Finance (*Angelov & Vasilev*)* – only fiscal, no monetary

- *Fiscal Ship* – US fiscal policy (with some political economy elements)

- *UK Prime Minister, US Fed Chairman, Swiss CB, NZ CB*,…(some are inactive now)

- 3-equation model by Carlin (or a similar pre-programmed "black box" based on a GUI)

- *Economia* (*no longer supported – flash game*) – ECB monetary policy – you can run it in a lab, have (pizza) competition among students at Lincoln

- On a general note: (turn-based) strategy games based on availability of resources, open- and closed world ones. Encourage certain type of games at home?

- Downside: students do not see what is "under the hood," and the mechanics of propagation; still, helpful for student engagement

A Digression: an Y2 Intermediate Microeconomics Example: from Teaching to Research

- A topic that led to a research paper (What if "absence of pollution" is a Giffen good? Unexpected effects of sugar tax – diabetics are punished for their medical condition)

- How can one obtain a Giffen good case (positive gradient of the demand function) – if one starts with the standard concave utility function, and a convex budget constraint.

- Usually books show (1) the convex indifference curve, talk about the substitution and income effect, and (2) tabulate different cases, including the Giffen case.

- But the Giffen case cannot be produced if the problem is standard. So the link between (1) and (2) is partially broken.

- Turns out – we need additional constraints, e.g. calorie constraint. Then we can have a Giffen good. The additional constraint in a way would make the utility function non-concave (and the indifference curves non-convex), which is the case that can generate a Giffen good. [But the "Giffen-ness" does not come from preferences per se]

- Furthermore, showing the Giffen good with a non-convex indifference curve would be "pedagogically problematic" as we spent so much time on the convex indifference curves and their meaning….

Y2: Intermediate Macroeconomics (Lincoln)

- Before Intermediate Theory modules – at AUBG, there were 2xxx electives, e.g. Money and Banking, Public Finance, Environmental Economics – beyond Principles, but lower level than intermediate module; Study some sub-fields of micro or macro in mode detail.

- Intermediate Macroeconomics: IS-LM model (closed economy in Term A, open economy considerations – Term B)

- At Lincoln, we start with the basic one, then extend to have dependence on the int. rate, include money, bonds, risky assets, etc…Some attempts to introduce expectations, and quasi-dynamics. The reason being is that the NK model in Y3 (and PGT level) yields a dynamic IS curve, as well as a dynamic NKPC. This nicely ties the micro-founded model with the earlier ad hoc vintage of models.

- *NB: In Y2, students at Lincoln have already had 2-semesters of higher maths, so the IS-LM could be tackled in a more rigorous way – deriving the gradients of the IS and LM curves, using (total and partial) differentiation, and even Cramer rule to show some comparative static results. Students have even seen difference equations in Y1, so seeing variables with different time indices does not come as a shock.*

- Keynesian Consumption Function – What did Keynes know? Why linear? (what was the state of knowledge and technology available to him?) "Follow the thinking" Scatter plot, basic linear regression (Excel).

- Aggregate Investment Function – investigate dependence on the interest rate, and sales

- Import function – dependence on income; Tax functions; Government Spending functions (extensions)

- Taylor rule – interest rate dependence on inflation and output gap (using HP filter to represent cycles), maybe on other things as well? (stock market, asset prices, housing prices, sustainability)

- Deficits and Debt dynamics, Twin Deficit hypothesis? Inflation control? Inflation as a tax – fiscal theory of inflation?

- Blanchard's European Macroeconomics book – shows IRFs from a shock to the interest rate. Explaining those as dynamic effects, and the IRF ands as CI, students learn VARs are a way to validate/test the IS-LM model.

- Through these elements and exercises, stimulate students' interest in macro topics – possible simple extensions for Y3

In Between Y2 and Y3 – role of placements and summer internships

- Best students from Intermediate Macro – offered a tutor position, or brought to help with some research topics, which could lead to an UG dissertation topic

- Some students at Lincoln go for a placement year after Y2 – We had successful placements in the UK Treasury (leading to permanent employment afterwards), ONS, etc. At AUBG – internships at the Bulgarian Central Bank (BNB), BG Ministry of Finance, etc.

- Those students return for Y3, really motivated from their real-world experience, and with good research ideas – which were explored in a dissertation. The quality is sometimes up to a level expected by an MSc dissertation.

Y3: Advanced Macroeconomics (Williamson's book)

- Micro-founded Macroeconomics, general equilibrium analysis
- Micro-foundations – covered in Y2 Microeconomics Sequence, plus the maths foundations in Y1 sequence; <u>Y1-Y2-Y3(-PGT-PGR) "feed-forward"</u>
- Links with IS-LM from Y2 Macroeconomics. Micro-founded setups produce a "dynamic NK IS-LM" and a "dynamic AS-AD" setups
- Perform some policy experiments using the Solow, and Ramsey models (Romer's book is becoming more and more undergraduate-level classic)
- Endogenous growth models – discuss the viability of theoretical models, empirical verification/testability
- Establish a strong fundament for future research in the field – especially if the students are retained for PGT (and PRG) studies.

Y3 (or Y4): Dissertation (Senior Thesis)

- Two-semester research project (general tendency: over-reliance on linear regressions/partial correlations, at the expense of theory)

- - Preceded by a semester on Research methods? (the semester before the last year)

- [In some EU countries, only a "habilitated" (senior) faculty member could teach this module. Often, only "habilitated" faculty member could be a module leader. Same holds for Programme leader, Head of Department, Dean, Head of School.]

- Submit a (feasible) proposal as a condition for enrolment in the Dissertation module - could be the assessment component of the Research Methods; could also count as 10% in the final mark.

- At AUBG, a student can be discontinued after one-semester, if there is no sufficient progress. The student then has to take an advanced module next semester. [ST I&II together counts as one module, but with mode cr.]

- Ruling out "infeasible" ideas, identifying "feasibility" – useful practical skills.

- Going beyond the textbook material: If there is need for extra training (an advanced method – non-linear GMM to estimate NKPC, SVAR restrictions to study monetary shocks, etc) – individual mentoring, and/or self-study. Powerful modules developed for STATA (but not many students use MATLAB/R/Python for mathematical modelling)

Post-(UG/PGT) Graduation

- With the best dissertations, after the graduation ceremony, we continue working with those best students in order to rework their dissertation into a publishable paper.

- I have had many instances when this joint effort ends up as an article in peer-reviewed journals with impact factor, or a book section (in some cases even indexed in SCOPUS and Web of Science)

- One student helped me produce a solution manual to all end-of-chapter exercises to Bernanke et al's Principles book.

- Some of my best students at Lincoln performed computational studies based on quantitative theory to evaluate (via simulations) the effects of Reagan, Thatcher, and Clinton tax reforms.

- Finally: Research as "disciplined thinking" (disciplined *non-artificial intelligence*). Economists as the engineers in social sciences, "tinkering," trying to understand how the world works – but without the luxury of turning "the social machine" on/off.

- **Macroeconomics - more like theoretical physics/astronomy? Historically, economists from the Lausanne group (Walras, Pareto, etc) – were well-trained in Newtonian Physics.**

- **Need to know modern (mathematical/statistical/computational) methods – to understand a world, where complexity is increasing over time. Unfortunately, the time of short-cuts (the "low-hanging fruits") may be over. *Future direction: Lessons from STEM?***