Teaching introductory economics: an interdisciplinary approach

Iqbal, Nabeel

North South University

8 March 2023

Teaching introductory economics: an interdisciplinary approach

Nabeel Iqbal

Department of Economics, School of Business & Economics, North South University.

Abstract

Using three examples, this opinion piece argues that introductory economics can provide an effective context in which to introduce university students to interdisciplinary learning and thinking. The first example illustrates how input-process-output diagrams can be used to stimulate interdisciplinary thinking in classrooms when teaching the concept of production. The second and third examples illustrate how elasticity and the concept of circular economies, respectively, can be introduced using an interdisciplinary approach. These examples are suitable for introductory economics classrooms in which students gain a foundation of basic scientific and mathematical concepts.

Context

Although interdisciplinary activity is increasingly present in postsecondary education (Klaassen, 2018; Davies and Devlin, 2010; Lattuca, 2001), it has not yet been fully investigated (Caviglia-Harris, 2010). Drawing on my own experience as an educator and using examples from introductory economics, I argue that conducting such research has a great deal to offer.

My examples were developed for teaching introductory economics in the tertiary education system of Bangladesh, which offers four-year undergraduate degrees consisting of general education courses on arts, humanities, and social sciences. Students have typically studied basic scientific and mathematical concepts as part of the curriculum in the compulsory stages of education.

Introduction

Interdisciplinary instruction is defined as transcending subject boundaries with the aim of integrating frameworks and methods from different disciplines to explore a concept or problem (Rover, 2002; Goldsmith and Casey, 2012; Woods, 2017). Among other benefits, an interdisciplinary approach can stimulate creativity in classroom activities and lead to the design of more authentic assessments. There is evidence that interdisciplinary teaching can help students to improve their abilities to synthesise and integrate information, think critically and holistically as well as develop self-confidence and a passion for learning (Caviglia-Harris 2010, Rover 2002, Goldsmith and Casey 2012). Referring to the field of economics, Caviglia-Harris

(2010, p.196) argues that interdisciplinary instruction "*can assist students in recognizing the importance of the discipline and help them to understand how it relates to other fields*". However, there are a number of challenges.

One obstacle for educators, identified by Lindvig and Ulriksen (2019), is a lack of `concrete examples' of interdisciplinary teaching available for educators to use or to stimulate their own ideas. This opinion piece focuses on three such examples to address that gap.

A further constraint is that there can be an expectation that interdisciplinary teaching will involve a restructure of the curriculum or require experts to be brought in from other departments (Pharo *et al*., 2012; Feedman, 2008). Yet I would argue that by building on the existing knowledge bank of students, an introduction to interdisciplinary thinking can be delivered without these additional costs and disruptions. Before entering higher education (HE), economics students will typically have gained a foundation of knowledge in mathematical and scientific concepts. An interdisciplinary approach in introductory economics classrooms can leverage this knowledge base.

Another barrier, when putting interdisciplinary approaches into practice, is the growing specialisation of students' knowledge, skills and mindset as they progress through their degrees. Blair and Durance (2012) argue that at higher levels of HE, students find interdisciplinary courses to be challenging and difficult. However, at the introductory level, students have not yet specialised and so this may be the optimal time to use a pedagogical approach that demonstrates interdisciplinarity and enables students to make connections between the disciplines (Freedman, 2008). Moreover, first-year classes are more likely to include students from mixed discipline areas and interests, creating a context in which meaningful links between disciplines can help facilitate a sense of belonging.

The literature does contain some examples of teaching economics using an interdisciplinary approach (Goldsmith and Casey, 2012; Blair and Durrance, 2012), but most of them are not suitable for introductory courses, which are likely to contain students who have never studied economics before (Islam, 2011). This opinion piece, using three examples, illustrates how interdisciplinary thinking can be stimulated in an introductory economics class by capitalising on the existing knowledge base that students typically bring with them into their learning at university. My own observations and informal feedback from students have suggested that this approach has been effective.

Example 1: teaching 'production' using input-process-output diagrams

This example shows how an input-process-output diagram – such as the one in figure 1 – used widely in other disciplines such as computer science and business studies, can be deployed to stimulate interdisciplinary learning and thinking in classrooms.

Figure 1: An input-process-output diagram

Input-process-output diagrams are, in my experience, one of the best introductions to interdisciplinary thinking, since the diagram is used to model different phenomena across different disciplines. For example, input-process-output diagrams are used to explain the function of a central processing unit (CPU) in computer science, and computer science students, who are usually required to take introductory economics courses, will be easily able to relate to the model. Also, it is likely to be familiar to students from their learning prior to their entering college or university about other input-output processes or systems, such as photosynthesis and respiration.

In the context of economics, input-process-output diagrams fit perfectly with the concept of production, defined as the process of transforming inputs (factors of production) into outputs (goods and services); discussion of this topic can therefore be facilitated and enhanced by reference to students' prior learning and to multiple uses of this visual representation.

Figure 2: Modelling the concept of production using an input-process-output diagram

Interdisciplinary thinking can be stimulated in class after the introduction of the concept of production using the diagram above (or a variation thereof) by asking and encouraging students to give examples of input-output-processes from their existing knowledge base. Then, based on

the students' answers, the instructor can point out that similar input-output processes exist across other disciplines, such as computer science and biology. For example, a living organism, such as a plant, also uses inputs, such as sunlight, water and carbon dioxide (the inputs), to produce its food (the output) and oxygen is produced as a by-product of this process. Similarly, the production process of economics can also lead to by-products, such as pollution (negative externalities). The discussion can thus naturally move towards the important economic concepts of positive and negative externalities.

Example 2: teaching 'elasticity' using an interdisciplinary approach

Elasticity is another topic in introductory economics which is well suited to stimulating interdisciplinary learning and thinking in economics classrooms. During an introduction to elasticity, the instructor has scope to encourage and aid students to integrate and synthesise diverse information, think more holistically about university education and identify patterns across disciplines.

When teaching the concept of elasticity, the educator can highlight that, across natural and social sciences, we are interested in studying the relationship between variables – or more precisely, how a dependent/outcome variable responds to changes in an independent/explanatory variable. The educator can build on the familiarity that students are likely to have from prior learning with concepts such as rate of change, slope, or gradient. Next, the teacher can point out that in economics, elasticity considers percentage changes while other units of measurement may apply in other fields.

The instructor can then highlight a common question asked across many disciplines: if independent/explanatory variable changes by one unit, then how much does the dependent/outcome variable change/respond?

The answer to this question is provided by the following formula for the rate of change, typically learned in the secondary school years.

$$\frac{\Delta y}{\Delta x}$$

In case of elasticity, we are changing our question only slightly; if independent variable increases by one per cent, then by what percentage does the dependent variable change (Pindyck and Rubinfield, 2013)? The answer can be found by slightly modifying the formula above:

$$\frac{\%\Delta y}{\%\Delta x}$$

This very generalised and interdisciplinary introduction to elasticity can be used to encourage students to find patterns/links across disciplines and encourage them to integrate and synthesise information accumulated in academic life. A generalised and interdisciplinary approach to teaching elasticity can also be used as a scaffold for creative exercises in which the students are required to apply the concept of elasticity in novel situations from their respective majors/disciplines. For example, an agricultural science student might be interested to find out if the percentage of fertilizer increases by one per cent, then by what percentage does the yield increase? In this case the formula, which students should be encouraged to derive, would be:

$$\frac{\%\Delta yield}{\Delta\%fertilizer}$$

The aim is to draw out examples from students' knowledge base and use them to facilitate a better, deeper and more holistic understanding of the concept of elasticity.

Example 3: introducing the concept of circular economies using interdisciplinary examples

In addition to providing another example of interdisciplinary teaching, example 3 is presented to argue that the concept of circular economies, a topic not included in many economics textbooks (Arnold, 2019; Tucker, 2019; Mankiw, 2016; Mankiw, 2018a; Mankiw, 2018b; Pindyck and Rubinfield, 2013), should be taught in every introductory economics classroom.

In my experience, an interdisciplinary approach can be particularly effective when introducing the concept of circular economies. The educator can highlight the point that natural systems – such as the carbon and water cycles – that students may be familiar with from previous or concurrent learning are circular in nature and hence sustainable. Then the educator can show that economic systems of production, consumption and disposal are, by contrast, usually linear in nature; however, economic systems can also be made circular through re-using and recycling. The following YouTube video, which also uses an interdisciplinary approach, may serve to introduce students to the concept of circular economies. This exercise can help students to realise that ideas from one discipline can be very relevant to and applicable in another field, thus providing the building blocks of interdisciplinary thinking and learning.

Conclusion

The above examples have been used successfully to introduce interdisciplinary thinking and learning in introductory economics classrooms consisting of students from different disciplines who have a foundation of knowledge of basic scientific and mathematical concepts. It is argued that teaching certain concepts using an interdisciplinary approach may facilitate greater classroom discussion and dialogue amongst students from different disciplines and help them integrate and synthesise past and present information. Systematic testing of this work, using a combination of student outcomes and feedback gained through focus groups, is planned to evaluate the benefits and explore limits and possibilities for extending and building on this approach with future cohorts.

Reference list

Arnold, R.A. (2019) *Economics* (13th edn.) Boston: Cengage. ISBN: 9781337617383

Blair, R.D. and Durrance, C.P. (2012) 'An interdisciplinary approach to teaching antitrust economics.' In: Hoyt, G.M. and McGoldrick, K.M. (eds.) *International Handbook on Teaching and Learning Economics*. UK: Edward Elgar Publishing, pp. 463-472. ISBN: 9781848449688

Caviglia-Harris, J.L. (2010) 'Introducing Undergraduates to Economics in an Interdisciplinary Setting.' *The Journal of Economic Education*, 34(3), 195-203. Available at: https://doi.org/10.1080/00220480309595214 (Accessed: 5 May 2022).

Davies, M. and Devlin, M. (2010) 'Interdisciplinary higher education.' In: Davies, M., Devlin, M. and Tight, M. (eds.) *Interdisciplinary Higher Education: Perspectives and Practicalities (International Perspectives on Higher Education Research, Vol. 5.* Bingley: Emerald Group Publishing Limited, 3-28. Available at: https://doi.org/10.1108/S1479-3628(2010)0000005004 (Accessed: 18 January 2023).

Freedman, O. (2008) 'Sex, Class, and History: An Experiment in Teaching Economics in an Interdisciplinary Setting.' *The Journal of Economic Education*, 39(3), 251-259. Available at: https://doi:10.3200/jece.39.3.251-259 (Accessed: 12 June 2022).

Islam, S. (2011) 'Teaching Introductory Economics to Students of Different Majors.' In: American Society of Business and Behavioral Sciences 18th Annual Conference, ASBBS, 2011. Las Vegas, NV. 22-27 February. Las Vegas, NV: ABSBBS, 877-885. Available at: http://asbbs.org/files/2011/ASBBS2011v1/PDF/I/IslamS.pdf (Accessed: 7 May 2022)

Klaassen, R.G. (2018) 'Interdisciplinary education: a case study.' *European Journal of Engineering Education*, 43(6), 842-859. Available at: https://doi:10.1080/03043797.2018.1442417 (Accessed: 23 May 2022).

Lattuca, L.R. (2001) *Creating Interdisciplinarity: Interdisciplinary Research and Teaching among College and University Faculty*. Nashville: Vanderbilt University Press. ISBN: 9780826513830

Lindvig, K. and Ulriksen, L. (2019) 'Different, Difficult, and Local: A Review of Interdisciplinary Teaching Activities.' *The Review of Higher Education*, 43(2), 697-725. Available at: https://doi:10.1353/rhe.2019.0115 (Accessed: 3 June 2022).

Mankiw, N.G. (2016) *Macroeconomics*. (8th edn,) Boston: Cengage. ISBN: 9781429240024

Mankiw, N.G. (2018a) *Principles of Microeconomics*. (8th edn.) Boston: Cengage. ISBN: 9781305971493

Mankiw, N.G. (2018b) *Principles of Macroeconomics.* (8th edn.) Boston: Cengage. ISBN: 9781305971509

Pharo, E.J., Davison, A., Warr, K., Nursey-Bray, M., Beswick, K., Wapstra, E. and Jones, C. (2012) 'Can teacher collaboration overcome barriers to interdisciplinary learning in a disciplinary university? A case study using climate change.' *Teaching in Higher Education*, 17(5), 497-507. Available at: https://doi:10.1080/13562517.2012.658560 (Accessed: 19 May 2022).

Pindyck, R and Rubenfield, D. (2013) *Microeconomics*. (8th edn.) Boston: Pearson. ISBN: 9780132857123

Rover, D.T. (2002) 'Interdisciplinary Teaching and Learning: What, why, and how.' *Journal of Engineering Education*, 91(4), 369-70. Available at: https://onlinelibrary.wiley.com/doi/pdf/10.1002/j.2168-9830.2002.tb00718.x (Accessed: 10 June 2022).

Staub, F.C., and Stern, E. (2002) 'The nature of teachers' pedagogical content beliefs matters for students' achievement gains: Quasi-experimental evidence from elementary mathematics.' *Journal of Educational Psychology,* 94(2), 344-355. Available at: https://doi.org/10.1037/0022-0663.94.2.344 (Accessed: 5 June 2022).

Tucker, I.B. (2019) *Survey of economics*. (10th edn.) Boston: Cengage. ISBN: 9781337111522

Woods, C. (2007) 'Researching and developing interdisciplinary teaching: towards a conceptual framework for classroom communication.' *Higher Education,* 54, 853-866. Available at: https://doi.org/10.1007/s10734-006-9027-3 (Accessed: 9 May 2022).