# INNOVATION AND ECONOMIC EDUCATION: AN INTEGRATION

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## ABSTRACT

Almost everyone agrees on the importance of educating a broad spectrum of the public about economics and business. It has been suggested by experts in economic education that universities should place greater emphasis on economics as a general education. The present paper develops a proposal to integrate innovation into elementary economic education that business faculties might use to enrich their general economic education offerings. We believe the proposal can be implemented through the design of a new subject – which may be called the 'Creative Economy' – supported by a method of teaching and learning by successive approximations. The study of innovation as an economic activity would provide useful tools to analyse the modern economy and would make the study of economics more attractive, especially for novices.

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## **INTRODUCTION**

Almost everyone agrees on the importance of educating a broad spectrum of the public about economics and business. It has been suggested that universities should place greater emphasis on economics as a general education. This point was forcibly made by Salemi and Siegfried (1999). In particular, these economic education specialists assert:

Sound educational principles and self-interest both dictate that departments should place greater emphasis on their general education courses. Greater emphasis on general education diversifies risks associated with variation in the number of majors. It also creates better-informed citizens and fits the needs of the growing number of students at two-year colleges. Salemi and Siegfried (1999, p. 357)

The be-all and end-all of economic science is to improve the living conditions of people in their everyday lives. This can be attained by improving resource allocation. However, once economic efficiency has been attained, a necessary condition to improve living standards in a sustainable manner is to create new products, new processes and new forms of organization.

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Generally speaking, introductory economics textbooks deal with innovation in a very peculiar way. As currently taught, innovation is introduced twice in most economics courses. First, the idea of innovation is introduced in supply and demand analysis as a cost-reducing supply shifter or as a creation of an entirely new market that may shift the demand for related goods. Second, in a macroeconomic context the idea is used to illustrate the importance of technological change to increase an economy's GDP. In both contexts the notion of innovation is a black box presented as some exogenous shock to the economic system.

Simply to know that there are innovations shifting curves tells us nothing about innovation as an economic activity. Furthermore, the *ad hoc* use of the notion of innovation for illustrative purposes appears to convey the message that innovation could not be explained in economic terms, or if it were possible to study innovation as an economic activity, it would be better initially to confine attention to existing products and relegate the treatment of innovation as an endogenous phenomenon to another subject. The promise is always in the future.

Neglecting innovation as an economic activity in the Principles courses prevents students from understanding key aspects of the behaviour of the modern economy such as competition based on innovation, not on prices, as well as the welfare implications of profit-seeking innovation.

Business innovation has become an important and pervasive phenomenon in the corporate economy. It leaps to the eye that one of the striking features of the contemporary economy is the rapid creation, adoption and diffusion of innovation. This has many and profound implications for the demand and supply of university graduates. Employers seek graduates who appreciate the importance of innovation (employers need 'game-changers,' not 'staid-players'). Universities should equip students with the tools to operate in the innovation age. To function effectively in today's world, economics students need a working knowledge of business innovation.

It is reasonable to assume that business students want to see relevance in the economics subject contents. To fulfil their expectations it is not enough to teach them that the demand and supply model is useful to show that when a cyclone hits Queensland, the price of bananas rises; or that a monopolist can be maximizing profits and making an economic loss. We believe that it would also be useful to explain business students why the pulse of change is rapid virtually everywhere in the modern economy.

It is an open secret that many business students find introductory economics subjects uninteresting.<sup>1</sup> There are at least three separable causes for this rejection that may operate singly or jointly. One possibility is that professors try to teach their students far too much. The second reason appears to be related with the form in which economic concepts are conveyed, particularly the use of equations and graphs too abstruse to comprehend. Finally, a third reason lies in the fact that introductory economics textbooks typically confine attention to existing products, and thereby, assume away innovation as an economic activity. Not surprisingly, these causes of rejection also constitute barriers to understanding economics.

As will become apparent, the proposal in this paper may help to overcome the barrier represented by the neglect of innovation as an economic activity in the introductory economics courses. The first barrier to understanding economics –quantity of subject content– is essentially a matter of academic judgement.<sup>2</sup> The second barrier –use of mathematical formalisms in economic education– has been discussed extensively by many authors in the last sixty years and will not be considered here.<sup>3</sup>

Even though one of the distinctive features of the modern economy is incessant profitseeking innovation, the reality is that innovation as an economic activity is everywhere except in the economics textbooks. Have economics teachers forgotten Schumpeter's (1934) deep insight, namely: no complete understanding of the economy is possible without a thorough grounding in the world of innovation? We believe the answer should be in the negative. The biggest obstacle lies in the difficulties surrounding the incorporation of innovation into elementary economic education as an endogenous phenomenon.

The present paper develops a proposal to integrate innovation into elementary economic education that business faculties might use to enrich their general economic education offerings. We believe the proposal can be implemented through the design of a new subject –which may be called the Creative Economy– supported by a method of teaching and learning by successive approximations. The study of innovation as an economic activity would provide useful tools to analyse the modern economy and would make the study of economics more attractive, especially for novices.

The organization of the paper is as follows. In the next section we articulate a justification for teaching business innovation as an additional problem area of economics. Sections 3, 4, and 5 describe the three approximations that may be fruitful to articulate teaching and learning in the area of innovation as an economic activity. Specifically, Section 3 identifies and outlines three dimensions that lie at the heart of innovation as a field of study; Section 4 presents a collection of interpretative tools useful to gain an understanding of innovation as an economic activity; and Section 5 makes contact with the idea of 'threshold concept,' and provides specific examples of this notion taken from the innovation field. Section 6 provides a rough outline of the proposed new subject. Section 7 concludes by briefly summarizing the gist of the proposal.

## **TEACHING AN ADDITIONAL PROBLEM AREA OF ECONOMICS**

There are at least two acceptable ways to characterize a scientific discipline. First, it is a common practice to define a field of study by pointing out a common denominator which is central to the discipline. For example, economics is the study of how society manages its scarce resources. Second, we can characterize a scientific discipline by identifying its object of study and presenting a list of the most important problem areas. For example, economics studies the economy and addresses the following problem areas: resource allocation; income distribution;

unemployment; inflation; economic growth; globalization of the world economy; environmental protection; human development; and economic institutions. New areas of concern may emerge over time.

Generally speaking, teaching a particular discipline means to impart an understanding of the main problem areas associate with its object of study. To justify the claim that a particular (additional) problem area should be taught to undergraduate students at least two conditions should be met: first, the proposed problem area has to be linked to the object of study of the discipline in a fundamental way, and second, there has to be a teaching method that enables students to understand the problem area in a systematic manner.

#### **Business Innovation**

It is fairly easy to show that business innovation is a problem area of both macro and microeconomics using the line of reasoning inaugurated by Schumpeter (1934). Economics is the study of the economy, and the economy is a complex evolving system. This implies that economic change is an integral part of economics. In turn, endogenous economic change is brought about by business innovation. Consequently, nothing could be plainer than the proposition that innovation is a problem area in a macroeconomics context.

It is also evident that business innovation is an important and pervasive phenomenon at the microeconomic level. Economic behaviour refers to that part of human behaviour which is connected with the material elements of well-being. Somewhat roughly, people act economically when an opportunity for gain is presented to them and they take it. Two simple examples of economic behaviour are as follows. First, when the activity of producing *existing* products signals prospective profits some people will engage in the business of producing those products. Second, when the creation of *novel* products opens the opportunity for making money some people will undertake innovative activities.

Business innovations are new ideas created with the intention of making money. These new ideas are materialized in new products or process as well as new forms of organizations. It should be clear that successful business innovations are indistinguishable from profitable new ideas. What may not be as obvious is that we can conceive a stylized ideas-driven economy revolving around new ideas with economic value. Specifically, we can envisage a *creative economy* defined as one in which the increase in the standard of living of its residents is primarily based on the production of profitable new ideas. Understanding the factors conducive to successful business innovation is of absolutely fundamental importance for any country that aspires to promote a creative economy.<sup>4</sup>

## The Methodology of Three Approximations

Innovation is a vast and complex field of enquiry where multidisciplinary interaction takes place. For example, the interaction between economics, law, management, and marketing is essential in the process of gaining an understanding of business innovation. What is needed is a methodology simple enough for instructors and students to visualize how the pieces of the jigsaw fit together.

The methodology proffered here consists of three successive approximations that can be briefly sketched as follows. The first approximation is a background model which breaks the domain of business innovation down to three dimensions –creativity, intellectual property and innovation environment– that interact in a meaningful way. The second approximation looks into the basic dimensions of innovation using interpretative tools such as core concepts, insights and conceptual frameworks. Finally, the third approximation differentiates between interpretative tools that enhance our understanding of the topic without provoking deep learning impact and those that represent a significant change in the perception of the subject matter.

The reader familiar with recent developments on the teaching and learning front will quickly recognise that the third approximation focuses on the difference between 'core concepts' and 'threshold concepts.' This distinction has profound implications for teaching and learning. The role of threshold concepts in engendering deep learning is currently under active investigation. An excellent introduction to the growing literature on this area –with particular regard to economics– can be found in the editorial paper by Davies and Guest (2009).<sup>5</sup>

## **Background model**

In order to understand complex phenomena it is often necessary to construct simple models. One way to proceed in studying business innovation is to provide a grand view of the innovation landscape. For lack of a better term, we call this grand map the *background model*. The background model reduces the complicated details of the innovation world to manageable essentials and asserts that to understand business innovation one needs to explore a triad of dimensions:

- Creativity, because there would be no new ideas without innovators using their personal creative energies; in particular, the vast majority of new ideas emerge because people and organizations want monetary gains from their creative efforts;
- Intellectual property rights, because the act of innovation typically creates intellectual property; innovators protect their new ideas using patents, copyrights, trade secrets, and trademarks; and

Innovation environment, because innovators need a fertile milieu to produce and commercialize new ideas; in particular, innovation as an economic activity requires cross-cutting institutions supporting innovativeness throughout the economy.

We next sketch the distinguishing features of this triad of dimensions.

## **Dimension•**: Creativity

An innovation is a new idea and the generation of a new idea involves a creative act. Unfortunately, the creative act is a phenomenon imperfectly understood. The formulation of a new idea may take years of hard work or arrive in a flash of insight as in the case of Harry Potter.<sup>6</sup> In essence, the creative act is a black box in the sense that there is no generally accepted explanation about the workings of the brain of an innovator. One of the few things that we know about the creative act is that it consists of the reconfiguration of old ideas in new ways to produce new ideas.

Apparently, there is a capacity for generating new ideas that it is better developed in some people than in others. This capacity is not necessarily associated with a rare combination of gifts. Would-be innovators look, ask, listen, and above all, use creative thinking. There are three main categories of creative thinking –logical thinking, lateral thinking and imaginary thinking–that support the creative act.

Logical thinking can be either logical inference or reliable inference. Logical inference (or deductive reasoning) is an inference in which, granted the truth of the premises (or assumptions), the conclusions *must* be true. In reliable inference, the conclusions do not *necessarily* follow from the premises (or assumptions) but there are reasons to believe that the conclusions are correct.

Lateral thinking emerges from the limitations of logical inference to generate new ideas. Getting new ideas from a *given* set of assumptions tends to become increasingly difficult (it is like drilling deeper for oil in the same hole). Lateral thinking is a way of thinking which seeks the solution to a problem by making associations with unrelated areas, rather than by pursuing deductive reasoning. Logical thinking "is digging the *same* hole deeper; lateral thinking is trying again elsewhere." de Bono (1968, p. 26).

Imaginary thinking is based in mental images that do not exist in reality or in facts that did not occur. For example, the kind of reasoning used by Joanne Rowling when writing about Harry Potter falls into the category of imaginary thinking. Another example is science fiction, that is, a fiction which draws imaginatively on scientific knowledge and speculation in its theme.

Sometimes innovators combine the three types of creative thinking. This may happen when the would-be innovators posit: "What would have happened if ... had happened (or not had happened)." The core elements in counterfactual reasoning are the identification of a situation that did not exist, the formulation of a set of alternative paths, and the logical analysis of the implications of these alternatives.<sup>7</sup>

## **Dimension2**: Intellectual property

Well-defined property rights exists when three basic elements are present: (a) to every property is assigned a well-defined owner with exclusive rights of ownership; (b) to the owner of the property goes the residual income accruing to the assets; and (c) the owner has the right to control the existing assets. These elements refer to both tangible and intangible assets. The existence of well-defined property rights is viewed as a basic presupposition to the proper functioning of a capitalist market economy.

The rewards to producing innovations are reduced by imitations. Governments introduce intellectual property rights to encourage the production of new ideas with economic value. There are four types of protection of intellectual property rights: patents, copyrights, trade secrets, and trademarks. The existence of intellectual property can be thought of as a barrier to entry into the market and has been extensively studied in the economics literature.

## **Dimension**: Innovation environment

The explanation of the last dimension requires a comprehensive conceptual framework consisting of (a) a macro component or *innovation infrastructure* (cross-cutting institutions such as universities, patent and copyright laws, etc. influencing innovativeness throughout the economy); (b) micro components or *clusters* (geographical agglomeration of interconnected companies in particular fields together with suppliers, related industries, and specialized institutions); and (c) the *links* between components.

We call this catch-all conceptual framework the *Nelson-Porter framework* because it originates from two (distinct) scholarly strands associated with Richard R. Nelson and Michael E. Porter to name only the most prominent contributors. Indeed, first is the concept of innovation infrastructure emerging from the immense national innovation systems literature, associated with Nelson (1993) among many others. Second is the cluster-based model of international competitive advantage based on an understanding of industrial clusters, a research agenda primarily developed by Porter (1990).

A pictorial description of the background model can be seen in Figure 1. We take for granted that any aspect of interest concerning innovation as an economic activity lies in at least one of the three dimensions shown in Figure 1.



Figure 1: The Background Model for teaching and learning innovation as an economic activity

#### **INTERPRETATIVE TOOLS**

The second approximation examines the basic dimensions using interpretative tools which summarize what researchers and practitioners have learnt about business innovation. There are seven interpretative tools that can be found in the intellectual tool-kit of business innovation. They can be described and exemplified as follows.

While *first principles* are statements suggested by the empirical evidence that we do not propose to challenge (for example, innovations occur and creative people react to incentives), *core concepts* are essential building blocks used to undertake analytic effort such as innovation costs, profitable new ideas and creative destruction.

*Insights* are penetrating mental visions that guide scientific research. There are at least five insights inextricably linked to the notion of a creative economy. These are:

Insight #1:The act of innovation consists of reconfiguring old ideas in new ways to produce<br/>new ideas, Schumpeter (1934, p. 68);Insight #2:Commercial innovation is essentially an economic activity, Schmookler (1966,<br/>p. 208);

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Insight #3:	The act of innovation is typically imperfectly appropriable, Nelson (1982, p.
	467);
Insight #4:	The existence of intangible inputs renders increasing returns inevitable, Romer
	(1990a); and
Insight #5:	Ideas and human capital are inherently different products, Romer (1990b).

*Conceptual frameworks* constitute intellectual constructs for organizing thinking about a problem. For example, if we ask what is an appropriate environment for the creation of profitable new ideas? the Nelson-Porter framework enables the development of a satisfactory answer. All conceptual frameworks have *underlying assumptions* –such as there exists economic freedom and self-interest predominates– which are not continually repeated but they are required for the validity of the arguments.

*Paradoxes* or statements seemingly contradictory but explicable as expressing a truth are a special type of interpretative tool. For example, the efficient firm's dilemma (namely: the more an efficient firm strives to remain the way it is today, the more probable is that it will fall away) reflects the truth that confining attention to efficiency may not be enough for survival in the modern economy. Finally, the last type of interpretative tool is given by *ongoing debates* on different views concerning a particular awkward question such as is DNA patenting acceptable? or does economic evolution always proceed slowly and gradually or make leaps from time to time?

#### **Threshold concepts**

Educators and students are familiar with terms such as first principles (e.g. people respond to incentives), core concepts (e.g. 'monetary price,' 'quantity demanded' and 'quantity supplied'), insights (e.g. 'the invisible hand of Adam Smith' and 'competition as a discovery procedure' due to Hayek (1978)), and conceptual frameworks (e.g. 'demand and supply model,' 'input-output model' and 'ISLM model.' The term 'threshold concept' is relatively new. It has been introduced to emphasize that the impact of some notions on our understanding of a particular discipline is deeper than others.<sup>8</sup> A *threshold concept* is a transformative gateway that leads to the understanding of deep ideas in a field of enquiry.

The notion of threshold concept is being developed within many disciplines (see for example the papers in Land et al, (2008). But economists have been quite prominent in this field. For instance, Davies and Guest (2007) show that the notion of threshold concept sheds new light on the problems of teaching and learning economics and present evidence that it is useful to think of threshold concepts in terms of a web. More recently, interesting connections have been established between threshold concepts and metalearning capacity in economics. Meyer et al. (2009).

Examples of threshold concepts in pure mathematics and economics are easy to find. The concept of a 'derivative' leads to a transformative way of looking at the slope of a curve and

constitutes a crucial stepping stone to enter the area of subtle mathematical ideas such as the notion of a 'tangent bundle' in differential topology. 'Opportunity cost,' 'comparative advantage,' 'elasticity,' 'partial equilibrium' and 'ISLM model' are threshold concepts in economics. Learners who are able to absorb threshold concepts will come to a new level of understanding crucial to the discipline.

Which interpretative tools in the study of innovation as an economic activity should be regarded as threshold concepts? Three conceptual understandings that appear to have a transformative effect on novices are: 'non-rival products,' 'creative destruction' and the dichotomy 'sustaining/disruptive innovation.' These threshold concepts were introduced by Romer (1990b), Schumpeter (1950) and Christensen (2003), respectively.

A product is *non-rival* if its use by one person does not reduce the ability of another person to use the same product. Specific examples of non-rival products are a *design* (because the use of the design by one person does not preclude the simultaneous use by another person, or even by many people) and a *firm's knowledge capital* (because the firm can use its knowledge capital simultaneously in multiple domestic and foreign locations).

In some economic sectors such as the information technology sector, competition through innovation tends to be more important than price competition. *Creative destruction* illustrates a particular case of competition through innovation. The process of creative destruction can be described as follows. Profit-seeking innovators try to achieve market power by creating a better product than their competitors. Over time (some) new products replace old ones, earn abnormal profits for some period of time, and are replaced in turn.

One obvious question immediately suggests itself. What kind of innovation is involved in the process of creative destruction? 'Disruptive innovation.' *Sustaining innovations* improve the performance of established products. The archetypal example of sustaining innovation is Toyota's innovation philosophy of Kaizen or continuous improvement, namely creative workers are constantly proposing small changes that perpetually bring the manufacturing process close to perfection. A *disruptive innovation* is a new idea that constitutes a significant shift from everything that has come before. For example, the personal computer was a disruptive innovation relative to the typewriter.

Or to add one more example of transformative conceptual understanding which by no means exhausts the list of possibilities, we mention the difference between 'ideas' and 'human capital' introduced by Romer (1990b). Everyone agrees that 'idea' means any conception (for example, an opinion, view or belief) existing in the mind. However, in economics 'idea' has a different meaning. *Ideas* are knowledge or information stored outside the human brain in places such as a book or a DVD. *Human capital* is the accumulation of education, training and experience stored in the human brain. Historically speaking, the separation between ideas and human capital goes back at least to the invention of writing to represent the spoken word (circa 3500 BC).

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It is not inconceivable that the insights of 'procedural threshold concept' and 'discipline threshold concept' introduced by Davies and Mangan (2008) could be of great importance in the area of business innovation. However, this refinement of the third approximation will not be attempted here.

## Design of a new subject

It is fairly obvious that the study of innovation as an economic activity requires the introduction of a whole new subject. This subject may be called the Creative Economy. Before going into the salient features of the Creative Economy it is well to emphasize that we do not deny that some universities currently offer specialized subjects on 'economics and innovation' where the *assumed* knowledge includes intermediate micro and macro, and at least rudiments of econometrics and mathematical economics. Furthermore, our subject proposal does not imply that we are decrying the importance of, or indeed the eventual necessity for, advance courses on the economics of innovation. The audience that we envisage for the new subject is undergraduate business students possessing very limited command of economics tools.

The overall purpose of the Creative Economy would be to assist business students in gaining a working knowledge of the contemporary economy from the angle of business innovation. Its mode of delivery would preferably be with adherence to a discursive, non-mathematical style. One would expect that the Creative Economy combines intrinsic intellectual interest with extrinsic practical application.

The literature on innovation as an economic activity is extensive, and therefore, it would not be difficult to compile a list of references for the Creative Economy. It is true that some references will contain mathematical models but it is true, also, that we can always translate the essence of the formal models into the verbal language.

As to the specification of the subject design, we mention only three components: subject description, subject content, and a general idea about the development of the lectures.

## **Subject Description**

The centre of gravity of the economy has shifted from tangible to intangibles resources, such as ideas with economic value. As a result, no complete understanding of the contemporary economy is possible without a thorough grounding in the world of innovation as an economic activity. This subject develops the interpretative tools necessary to understand the multiplicity of factors that govern a creative economy and provides a new lens for viewing and interpreting an important part of the economic reality in which you live.

#### **Subject Content**

Innovation as an integral part of economics; ideas and human capital as different economic products; creative destruction, disruptive innovations and market power; distinguishing features of the venture capital market; increasing returns to scale and increasing returns to feedback; innovation infrastructure; intellectual property rights (patents, copyrights, trade secrets, and trade marks); research and development and innovation externalities; new ideas and international competitive advantage; innovation policy.

#### **Development of Lectures**

We believe that the methodology of three approximations should be presented in the first lecture. This would allow students to know from the very beginning the approach for teaching and learning underlying the forthcoming lectures.

## **Initial Lecture**

The main purpose of the initial lecture is to provide a bird's eye view of the essential distinguishing feature of a Creative Economy, namely: the creation of ideas with economic value. This lecture would introduce the three successive approximations (background model, interpretative tools, and threshold concepts) and show how some key aspects of commercial innovation would move through the various dimensions and the three approximations along the following lines.

When creativity is applied to producing intangible products such as a design for a diamond ring we are located on Dimension 1 of the background model. We may move along this dimension by using interpretative tools such as innovations occur (first principle), the creation of new ideas consists of combining existing ideas into different new ideas (Insight #1), and the production of ideas involves innovation costs (core concept). The distinctive feature of the notion of 'innovation costs' is that the cost of creating a new idea is a one-time cost because the idea needs to be created once. This implies that the innovation costs incurred to produce the first unit of the new product tend to high in comparison with the cost of subsequent units. For example, the first disk of Windows to go out the door cost Microsoft \$50 million, the second and subsequent units cost just \$3.00. Furthermore, there is a singular characteristic displayed by intangible products which is not shared by physical products. What is distinctive about ideas as economic products is that they can be used simultaneously by many people, that is, ideas are always non-rival products.

The foregoing points would help students to perceive the importance of ideas as economic products from the very first lecture. Next, we can identify concepts that change their understanding of the topic forever and implement the third approximation. Concepts such as 'innovation costs' and 'non-rivalry' are interpretative tools that not only enhance our understanding of the economics of ideas but also provoke a significant change in our perception of the topic itself.

Given the inherent complexity of innovation as a field of study, it is not surprising that there are numerous byways inducing us to contemplate the other two dimensions. Protecting economic ideas is vital to stimulate creativity (if the innovations can be easily imitated without penalty, self-interested individuals will not have incentives to innovate). Ideas as economic products are at least partially excludable. This is an issue inextricably linked to Dimension 2 (Intellectual Property). The appropriate type of protection (patents, copyrights, etc.) depends on the preferences of the innovators.

If there is a lesson to be learned from the history of innovation, it is that the 'national circumstances' can contribute to or detract from commercial innovation. The Dimension 3 (Innovation Environment) of the background model captures the national circumstances in a stylized manner. The Nelson-Porter framework is an interpretative tool that works exceedingly well to organize thinking about the national circumstances that are compatible with a creative economy.

## **Forthcoming Lectures**

The specific topics included in the subject content would be taught and learnt in the forthcoming lectures. It should be noticed that the initial lecture provides not only a view of the subject landscape "from above" but also a vision that can be used by both the instructor and the students throughout the delivery of the subject. For example, given any particular topic students would be able to (a) allocate the topic to one or more of the triad of dimensions involved in the background model; (b) identify the interpretative tool/s they are using; and (c) recognize that there is always an innovation environment surrounding profit-seeking innovation.

## SUMMARY

One of the striking features of the modern economy is the existence of incessant business innovation. Few economists would presumably disagree with the importance of business innovation as a crucial determinant of the rate of economic growth or with the practical relevance of competition through innovation. However, there is no easily available instructional design to impart an understanding of innovation as an economic activity.

The unifying theme of this paper is that rudiments of profit-seeking innovation should be taught to business students by economics teachers. There are at least two advantages emerging from our proposal. First, graduates would be better equipped to develop professional activities in the innovation age, and second, the study of economics would become more attractive to novices.

We have shown that the proposal is both scientifically and educationally sound. We can confirm straightaway that innovation is an integral part of economics by noting that endogenous economic change is brought about by business innovation in a fundamental way. Business people are the conceivers of the bulk of innovations of the contemporary society. Furthermore, we have demonstrated that there exists a method for teaching and learning business innovation that can be used to assist students in grasping the essentials of innovation as an economic activity. A major attraction of this method is that it efficiently enables novices to deal with the formidable amount of information about commercial innovation.

The best way to look at the method of successive approximations is through an analogy. Teaching and learning business innovation is like ranging over a distant planet for the purposes of discovery. The approach would involve successive approximations. The background model is a telescopic view of the planet 'business innovation' where students are exposed to the fundamental dimensions of the field of enquiry. A closer –or satellite view– occurs when students learn how to analyse issues related to business innovation. The third approximation –or helicopter view– happens when students come to a new level of understanding of the essence of profit-seeking innovation. This analogy is pictorially described on Figure 2 and may be useful for helping students to connect with the suggested pedagogical approach.





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We believe that the methodology of three approximations would provide a coherent guidance for the study of the Creative Economy. It is important to present at the very beginning the overall approach underlying the development of the subject because in that way the teacher and the students are working in the same manner to get better results in the learning process.

Finally, it should be emphasized that the Creative Economy would complement – not substitute – the traditional offerings that can be found in a typical economics program within a faculty of business. Some colleagues may be inclined to believe that few academic economists would be interested in teaching an entire subject on innovation as an economic activity. But that perception remains to be tested. It is not inconceivable that young assistant professors would see the task of teaching innovation from an economic perspective as a challenge to prevail over rather than an insurmountable barrier.

#### **AUTHOR'S NOTE**

\* The comments of two anonymous referees greatly improved the paper.

#### **ENDNOTES**

- <sup>1</sup> Anecdotal evidence abound. See, for example, Frank (2007).
- <sup>2</sup> Useful guidance in this connection can be found in Salemi and Siegfried (1999, esp. pp. 357-358).
- <sup>3</sup> The psychological problems associated with the use of mathematics in economics were first analysed by Samuelson (1952). For a discussion of the place of mathematics in economics, see the symposium in the *Review of Economics and Statistics*, vol. 36, No.4, November 1954 which includes Samuelson (1954).
- <sup>4</sup> The first mathematical model of an ideas-driven economy is due to Romer (1990).
- <sup>5</sup> More on 'threshold concepts' later in Section 5.
- <sup>6</sup> " All of a sudden the idea of Harry just appeared in my mind's eye. I can't tell you why, or what triggered it. But I saw the idea of Harry and the wizard school very plainly." Smith (2002, p. 107).
- <sup>7</sup> The most well-known example of the counterfactual approach (among economists) is Robert W. Fogel's scientific breakthrough on the role of the railways in the American economy. Fogel (1964).
- <sup>8</sup> The notion of 'threshold concept' was first proposed by Jan H. F. Meyer. See Meyer and Land (2006).

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