TEACHING AND LEARNING BUSINESS INNOVATION BY SUCCESSIVE APPROXIMATIONS

Eduardo Pol
University of Wollongong

Abstract

This paper describes a strategy for teaching and learning business innovation by successive approximations. This strategy has two major sources: the book by Pol and Carroll (2007) An Introduction to the Creative Economy, and intense observation of how novices learn the discipline. I use an analogy between the study of business innovation and the observation of an unknown planet as a tool in helping readers to connect with the suggested pedagogical approach. In essence, the approach consists of three approximations: first, identification of the dimensions or areas that are of absolutely fundamental importance for teaching and learning business innovation; second, development of the interpretative tools necessary to understand these dimensions; and finally, identification of conceptual understandings that have a powerful transformative effect on novices.

Contents

1. Introduction

2. First Approximation: Background Model

3. Second Approximation: Interpretative Tools

4. Third Approximation: Threshold Concepts

5. Reprise
1. Introduction

**Motivation**

The number of business innovation related courses at the undergraduate level is gradually increasing due to unstoppable market forces. One of the striking features of the contemporary society is the rapid creation, adoption and diffusion of innovation in technologies, markets and organizations. As a result, business innovation has become an important and pervasive phenomenon in the corporate economy. Issues concerning innovation, international competitive advantage, and new technology feature heavily in the economic and business pages of the national media and are prominent in public policy debate. In a nutshell, we live in the *innovation age*.

This has many and profound implications for the demand and supply of university graduates. Employers increasingly seek graduates who appreciate the importance of innovation (‘game changers’, not ‘staid players’). In particular, this requires a close understanding of the process of innovation and its implications, and an ability to develop flexible skills. From the supply side perspective, students go from the university to the real world where innovation is not just important but imperative. Higher education institutions have no choice: they have to keep pace with changes in the needs of both employers and incoming student cohorts.

**A Difficult Task**

Designing and developing materials for teaching and learning business innovation is a difficult task for at least two reasons. First, innovation is a social phenomenon too complex to be analysed properly from a single disciplinary angle. As a result, innovation has been studied by different social scientists with different backgrounds. One consequence of this multidisciplinary approach has been terminological *fuzziness* with respect to basic concepts. This in turn has created a sort of intellectual labyrinth conducive to the frustration of both teachers and beginner students.

Second, textbooks specifically addressing the needs of beginners in the discipline of innovation are surpassingly rare.\(^1\) It is true that there is an immense literature in areas such as innovation and economic growth, evolutionary economics, and strategic management of business innovation. But it is true, too, that the authors tend to be more interested in making contributions to their field rather than presenting the material in a novice-oriented way.

**Audience: Teachers and Students**

This paper sketches a strategy for teaching and learning business innovation that may help instructors as well as undergraduate students. I believe that it is a good idea to share with your students your strategy for teaching and learning because this allows students to see that their teacher follows a predetermined (non-random) path, and above all, disclosure of your pedagogical approach allows students to form an opinion about the efficacy of your strategy. I have tried to write the suggested strategy

\(^1\) To the best of my knowledge, there are only two textbooks that have been specifically written for novices in the discipline of business innovation, namely: Pol and Carroll (2006) and Pol and Carroll (2007).
succinctly so you can read it quickly and evaluate its usefulness for teaching and learning purposes.

Sources of the Strategy

Before going into the development of my strategy for teaching and learning business innovation, I would like to point out the immediate origins of my approach. These origins can be encapsulated into two sources.

The first source of my approach is the book An Introduction to the Creative Economy. It should be clear to the readers of Pol and Carroll (2007) that the Creative Economy is inextricably linked to business innovation. In fact, to understand the behaviour of this kind of economy we have to describe and discuss many of the most important issues related to business innovation. What may not be so clear is that our book contains a tacit strategy for teaching and learning business innovation.

The second source of my approach is as follows. I have been teaching business innovation at the University of Wollongong, Australia, at the undergraduate level during the last four years in a subject which is my own creation. This elective subject has attracted thousands of students since its introduction in 2004. The task of teaching business innovation has been accompanied by intense observation of how novices learn the discipline. The findings support the view that what I call the “successive approximations approach to teaching and learning business innovation” enables novices to properly absorb both the generalities and details of business innovation.

Analogy

The best way to explain my approach is to use an analogy. Suppose that you want to gain an understanding of an unknown planet. How would you go about that? Well, you start with a telescopic view as a first approximation, then you go for a satellite view as a second, then, you implement a helicopter’s view, and so on. Similarly, if you want to gain an understanding of business innovation, you start with a telescopic view, that is, a distant picture consisting of the identification of the main dimensions of business innovation, then you implement a satellite view where you explained the current state of understanding of these dimensions (endowing students with the basic interpretative tools of the discipline), and finally, you perform a third approximation where you identify concepts that will significantly change the students’ view of business innovation forever.

Organization of the Paper

The paper is organized as follows. Sections 2, 3, and 4 describe the content of the various approximations. The final section of this paper returns to the above mentioned analogy and offers a pictorial description of the successive approximations approach for teaching and learning business innovation at the undergraduate level.

---

2 The subject identification is COMM 327: Business Innovation, Technology, and Policy. This is an ‘integrating’ subject emerging from many years of research in the field of innovation. An integrating subject is characterized by two attributes: the subject must have a multidisciplinary approach and must be non-compulsory.
2. First Approximation: Background Model

The strategy for teaching and learning business innovation starts with the identification of areas that are of absolutely fundamental importance. More precisely, the starting point of the approach is a ‘background model’ that breaks the domain of business innovation down to a few dimensions or areas that interact in a meaningful way. The dimensions in question are:

- **Dimension 1:** Creativity,
- **Dimension 2:** Intellectual Property, and
- **Dimension 3:** Innovation Ecosystem.

These dimensions are of absolutely fundamental importance because they capture the entire content of business innovation as a field of enquiry.

Not surprisingly, the three dimensions are related to each other. For example, if there is a lesson to be learnt from the history of innovation, it is that ‘creativity’ is intense in societies that (a) protect the right of innovators to enjoy the returns from their new ideas (an innovator can expect to become rich because the community respects ‘intellectual property’) and (b) encourage innovators by awarding them medals or intangible symbols of status such as media recognition (that is, societies with an appropriate ‘innovation ecosystem’).

The Background Model for teaching and learning business innovation can be thought of as a telescopic view of a distant planet. In essence, the model tells us that any important theme in the domain of business innovation is included in at least one of these broad dimensions. For example, creative thinking and outsourcing innovation are included in Dimension 1; patents and copyrights are elements of Dimension 2; and innovation infrastructure (e.g. universities and research institutes) and industrial clusters (e.g. Hollywood and Silicon Valley) are an integral part of Dimension 3.

A pictorial description of the Background Model can be seen in Diagram 1. This diagram points out that (a) the model provides a big picture of business innovation to focus student attention; (b) the purpose of the model is to optimize student learning; and (c) imaginative resources such as non-mathematical diagrams are required to avoid student fatigue.

**DIAGRAM 1 HERE**

It goes without saying that these dimensions cover lots of content. If we want to impart an understanding of business innovation, we must explain the key elements underlying each dimension. This requires a variety of analytical elements.

3. Second Approximation: Interpretative Tools

The second approximation is to obtain a satellite view consisting of the body of understanding of those who have studied business innovation for a long time. To this end, we need to identify ‘interpretative tools’ in the sense of hard-won notions and results that enable us to approach the subject matter in a coherent way.
In each subject field there are interpretative tools which summarize what the researchers and practitioners have learned. We believe that it is a primary obligation of a teacher to find ways of helping students to learn these tools, and especially, to help students to learn how to use them in a great variety of problem situations.

The interpretative tools within the discipline of business innovation include:

- First principles (statements suggested by the empirical evidence that we do not propose to challenge, such as innovations occur or creative people react to incentives);
- Core concepts (e.g. innovation, homo creativus, creative economy, ideas, human capital, perpetual innovation and creative destruction);
- Insights such as the ones that can be found in Pol and Carroll 2007, p. 73);
- Conceptual frameworks (e.g. recombinant model of the creative economy, ecology of the creative economy and innovation life cycle);
- Underlying assumptions (there exists economic freedom, innovators pursue a combination of the three Fs fortune, fame and freedom, etc.)
- Paradoxes (e.g. the efficient firm’s dilemma and the innovator’s dilemma);
- Ongoing debates (Is economic evolution continuous or discontinuous? Is DNA patenting ethically acceptable? etc.)

Note, then, that an interpretative tool can manifest itself in various facets. The second approximation can be condensed by putting together the preceding seven facets. Diagram 2 shows these facets together with a specific example of the current understandings.

4. Third Approximation: Threshold Concepts

What distinguishes a knowledgeable analyst from all other people who talk and write about business innovation is a command of analytical elements that we have termed ‘interpretative tools.’ We now want to differentiate between conceptual tools that represent seeing things in a new way and those that enhance our understanding of the subject field without provoking a significant change in the perception of the subject matter. More concretely, what we want to do is to look at those interpretative tools with a magnifying glass and tease out some of the concepts that change our understanding of the discipline forever. These concepts are generally referred to as ‘threshold concepts.’

3 The notion of ‘threshold concept’ was introduced by Jan H. F. Meyer. See Meyer and Land (2006).
Threshold Concepts Defined

Educators and students are familiar with terms such as ‘core concepts’ and learning objectives such as ‘be able to think like an economist.’ Threshold concepts are core concepts, but the converse is not true. A threshold concept is a transformative gateway that leads to the understanding of deep ideas in a field of enquiry. Once on the gate learners come to a new level of understanding crucial to the discipline. By definition a threshold concept significantly changes the way of thinking about important aspects within the discipline.

To sum up, a threshold concept represents a significant shift in the perception of an abstract entity or phenomenon that leads to a qualitatively different view within a discipline. For example, in pure mathematics the concept of a ‘derivative’ is a threshold concept because it allows us to develop a new way of looking at the slope of a curve. The notion of ‘opportunity cost’ is an example of threshold concept in the study of economics. Somewhat roughly, every choice entails a sacrifice (if I choose going to the movies, I cannot be exercising at the same time). Opportunity cost is a core concept in economics that changes our way of thinking about choices in a fundamental way.4

Threshold Concepts in Business Innovation

Which notions in the discipline of business innovation should be regarded as threshold concepts? Some of the concepts opening up a new and previously inaccessible way of thinking about business innovation are ideas, human capital, non-rivalry and disruptive innovation.5

- Ideas and Human Capital

In the discipline of business innovation, ideas and human capital constitute threshold concepts. Ideas are knowledge or information stored outside the human brain. Human capital is the accumulation of training, education and experience stored in the human brain. When a person dies his/her human capital disappears, but any new ideas emerging from this person may be stored in, for example, a manual or a textbook.

Note 1

Learning threshold concepts may take a considerable amount of time. For example, to understand in depth the definition of ‘derivative’ may require ‘mathematical maturity’ (this is probably due to the fact that the concept of a derivative tends to be troublesome for some learners). However, threshold concepts may also be more or less immediate to grasp, as in the case of ‘ideas’ and ‘human capital’.

4 A detailed treatment of the notion of opportunity cost can be found in Pol and Carroll (2006, Appendix A to Chapter 2).
5 These illustrative examples do not exhaust the list of conceptual understandings that have a formative effect on novices: ‘commoditization’ and ‘mega-invention’ are also threshold concepts. For a definition of these terms see Pol and Carroll (2007, p.151 and p. 166, respectively).
Note 2

Typically, threshold concepts open a new way of thinking about something. For example, the separation of ideas from human capital enables us to see that knowledge accumulation at the macro level happens because human beings (at least from the invention of writing to represent the spoken word onward) have been able to transmit a substantial proportion of their knowledge to future generations in a codified way.

- Non-rivalry

Another important example of a threshold concept in business innovation is the notion of ‘non-rivalry.’ A product is non-rival if its use by one person does not reduce the ability of another person to use the same product. To illustrate this concept, consider the creation of a design (new idea) for the production of a futuristic shirt and assume that the designer is able to put in writing this new idea in just one page. The design (new idea) only needs to be created once. In order to sell the design, the designer can make millions of photocopies of the instructions to produce the shirt. This means that the use of the design by one person does not preclude the simultaneous use by another person, or even by many people.

That ideas are important to business innovation seems almost an obvious statement. However, the property that ideas are non-rivalrous has non-obvious and profound implications. For example, ideas with economic value can be spread worldwide and make enormous profits if they can be protected from free-riders.6

The concept of non-rivalry implies a significant shift in the perception of the notion of ‘capital.’ A firm’s knowledge capital is its unique collection of intangible assets resulting from investing in innovation (e.g. R&D investment).7 What distinguishes knowledge capital from other forms of capital is the fact that it is non-rival, that is, a firm can use its knowledge capital simultaneously in multiple domestic and foreign locations.

- Sustaining and Disruptive Innovations

Sometimes threshold concepts do not come as a single concept but as dichotomy. The partition of innovations into two classes (sustaining innovations and disruptive innovations) is an important example of this peculiar point. If accepted as a valid way of interpreting the world, the dichotomy ‘sustaining/disruptive innovations’ fundamentally changes our way of thinking about the nature and implications of innovations.

---

6 To enforce property rights on ideas is not an easy task. Suppose that the designer of the futuristic shirt has a patent on her design. She has no ability to stop other designers to learn from the design of the futuristic shirt. Somewhat roughly, we can say that ideas tend to be only partially excludable. Of course, if the new idea is protected by a trade secret (the innovation is protected by keeping it secret) we can say that there is complete excludability.

7 Specific elements included in the collection of intangible assets are intellectual property rights such as patents, copyrights, trade secrets, and trademarks.
Sustaining innovations improve the performance of established products. This kind of innovations gives customers better versions of what they say they want. Examples of sustaining innovations abound: a new type of cornflakes that rapidly becomes soggy, a new kind of toothpaste, and a new variety of laundry detergent are a few.

A disruptive innovation constitutes a major shift from everything that has come before. Disruptive innovations can take the form of a new offering, a new process, or even a new business model. The personal computer was a disruptive innovation relative to the typewriter.

Many products originated by disruptive innovations tend to be cheaper, simpler and more convenient to use. Honda, Kawasaki, and Yamaha motorbikes were disruptive innovations relative to the ones made by Harley-Davidson and BMW. A disruptive innovation typically requires the search for a new market that values the characteristics of the disruptive product. When disruptors build emerging markets, they are doing something that makes no sense for established firms.

Disruptive innovations have been launched most often by entrant firms. The established firms almost always lose the battle because disruption has a paralysing effect on incumbents. The disruption of integrated steel mills by mini-mills is a classical example of this general rule.

The implications of threshold concepts initially seem somewhat counterintuitive, but as we come to understand them, the notions are revealed sensible. Consider, for example, the impact of disruptive innovations on the principles of good management.

It is easy to explain why poorly managed firms crash, but it is difficult to find out why the best-run companies fail. The analysis of disruptive innovations suggests that widely accepted principles of good management (e.g. investing only in sustaining innovations to satisfy customers and investors) are correct only in certain conditions. There are times at which it is right not to confine attention to sustaining innovations because these innovations may sow the seeds of eventual failure. This analysis is transformative in that, once understood, provokes a significant change in the conventional managerial wisdom.

Summary and Remarks

The preceding concepts (namely: ideas, human capital, non-rivalry and sustaining-disruptive innovations) provide a transformed way of understanding business innovation. Without a grasp of these concepts the learner cannot gain a deep understanding of discipline of business innovation. Diagram 3 shows a working definition of threshold concepts in business innovation together with a few examples.

**Diagram 3 Here**

What is the logical relationship between core and threshold concepts? Core concepts are building blocks that enable understanding of the subject field, but do not necessarily lead to a different view of the subject matter. For example, patents
copyrights, trade secrets and trademarks are core concepts because they clarify the various ways of protecting new ideas; however, they do not change our way of thinking about how innovations occur. Threshold concepts are always core concepts but core concepts need not be threshold concepts. For example, non-rivalry is a threshold concept, and therefore, a core concept as well; however, ‘profitable new idea’ is a core concept, but not a threshold concept.

Sometimes the notion of threshold concept has to be extended to that of a threshold framework. The visual model of international competitive advantage illustrates this point. The model (due to Michael E. Porter) derives the notion of international competitive advantage using a systemic approach. The system in question has a peculiar emergent property (namely: international competitive advantage) that its components lack. The Porter conceptual framework is a transformative gateway that leads to a deep understanding of international competitive advantage.

5. Reprise

At the end of the day, what every teacher wants is to promote a high level of student engagement with course content. A necessary condition to achieve this aim is to have a clear teaching and learning strategy.

I believe that the foregoing instructional design may be useful for teaching undergraduate business innovation. My approach to teaching and learning business innovation rests on a fundamental premise: innovation is a multidimensional phenomenon that cannot be easily squeezed into a particular discipline such as economics, law, management, marketing or psychology.

This approach is neatly reflected in the Background Model which suggests that the teaching of business innovation revolves around three dimensions (namely: creativity, intellectual property, and innovation ecosystem). These dimensions involve a multitude of perspectives based on—or cutting across—existing social sciences.

The second approximation to teaching business innovation goes down to the nitty-gritty. It is designed to introduce the interpretative tools required to gain an understanding of the subject field. Quite obviously, this approximation consumes a substantial proportion of the period of time allocated to teaching the subject, say 9 out of 13 weeks session.

The third (and final) approximation consists of identifying the concepts that open up a new way of thinking about business innovation. These threshold concepts represent a transformed way of understanding the subject field. I firmly believe that endowing novices with a working knowledge of threshold concepts contributes to good learning outcomes.

I conclude by returning to the opening analogy, namely imparting an understanding of business innovation is like exploring an unknown planet. Diagram 4 is a schematic representation of my strategy for teaching and learning business innovation. The

---

Diagram suggests that to impart a holistic understanding of innovation it is convenient to proceed by successive approximations.

**DIAGRAM 4 HERE**

**References**


Diagram 1

1. CREATIVITY
There would be no new ideas without innovators using their personal creative energies.

2. INTELLECTUAL PROPERTY
The act of innovation typically creates intellectual property.

3. INNOVATION ECOSYSTEM
Innovators do not operate in a vacuum. They need a fertile ecology to produce new ideas.
Diagram 2

**CORE CONCEPTS**
- Perpetual innovations

**INSIGHTS**
- Ideas and human capital are different economic products

**CONCEPTUAL FRAMEWORKS**
- Innovation life cycle

**FIRST PRINCIPLES**
- Innovations occur

**ONGOING DEBATES**
- DNA patenting

**PARADOXES**
- The innovator’s dilemma

**UNDERLYING ASSUMPTIONS**
- There exists economic freedom

**INTERPRETATIVE TOOLS**
summarize what researchers and practitioners have learned
THRESHOLD CONCEPTS

represent a significant shift in the perception of a phenomenon that leads to a qualitatively different view within the discipline of business innovation.

Diagram 3
Diagram 4

FIRST APPROXIMATION
(Background Model)

SECOND APPROXIMATION
(Interpretative Tools)

THIRD APPROXIMATION
(Threshold Concepts)

TELESCOPIC VIEW

SATELLITE VIEW

BUSINESS INNOVATION

HELICOPTER’S VIEW