

1-1-2008

## Teaching and learning business innovation by successive approximations

Jorge E. Fernandez-Pol  
*University of Wollongong*, [epol@uow.edu.au](mailto:epol@uow.edu.au)

Follow this and additional works at: <https://ro.uow.edu.au/commpapers>



Part of the [Business Commons](#), and the [Social and Behavioral Sciences Commons](#)

---

### Recommended Citation

Fernandez-Pol, Jorge E.: Teaching and learning business innovation by successive approximations 2008, 1-29.  
<https://ro.uow.edu.au/commpapers/1130>

---

# Teaching and learning business innovation by successive approximations

## Abstract

This paper describes a strategy for teaching and learning business innovation by successive approximations. This novel strategy has two major sources: the book *An Introduction to the Creative Economy* by Pol and Carroll (2007), and intense observation of how novices learn the discipline. I will draw an analogy between the observation of an unknown planet and the study of business innovation as a tool for helping participants 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. The strategy has been class-tested in four consecutive sessions. Student feedback has been highly positive.

## Keywords

Teaching, learning, business, innovation, successive, approximations

## Disciplines

Business | Social and Behavioral Sciences

## Publication Details

Pol, E. (2008). Teaching and learning business innovation by successive approximations. 8th Global Conference on Business & Economics (pp. 1-29). Florence, Italy: Association for Business & Economics Research.

## **Teaching and Learning Business Innovation by Successive Approximations**

Eduardo Pol\*

School of Economics  
University of Wollongong  
Wollongong, New South Wales  
Australia 2522  
e-mail address: [epol@uow.edu.au](mailto:epol@uow.edu.au)  
Phone: +612 4221 4025

\*I am extremely grateful to Dr Gordon Joughin from the Centre for Educational Development and Interactive Resources at the University of Wollongong whose advice and comments have made this paper much better than it would have been. He, of course, bears no responsibility for the content of the paper.

## Teaching and Learning Business Innovation by Successive Approximations

### ABSTRACT

This paper describes a strategy for teaching and learning business innovation by successive approximations. This novel strategy has two major sources: the book *An Introduction to the Creative Economy* by Pol and Carroll (2007), and intense observation of how novices learn the discipline. I will draw an analogy between the observation of an unknown planet and the study of business innovation as a tool for helping participants 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. The strategy has been class-tested in four consecutive sessions. Student feedback has been highly positive.

### INTRODUCTION

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*.

The foregoing has 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.

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 analyzed 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.<sup>1</sup> 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.

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, the 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 succinctly so you can read it quickly and evaluate its usefulness for teaching and learning purposes.

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* by Pol and Carroll (2007). It should be clear to the readers of this book that a 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 is as follows. I have been teaching business innovation at the University of Wollongong, Australia, at the undergraduate level during the last five years in a subject which is my own creation.<sup>2</sup> 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.

The best way to introduce 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 approximation, then, you implement a helicopter 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 explain 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 change the students’ view of business innovation forever. The whole strategy presupposes that there is intense student activity in parallel with the implementation of the various approximations.

The paper is organized as follows. Sections 2, 3, and 4 describe the content of the three successive 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. An appendix at the end of the paper succinctly explains how the strategy was class-tested and illustrates the students' reaction to the approach.

### **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 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 regional 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.

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.

## **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.



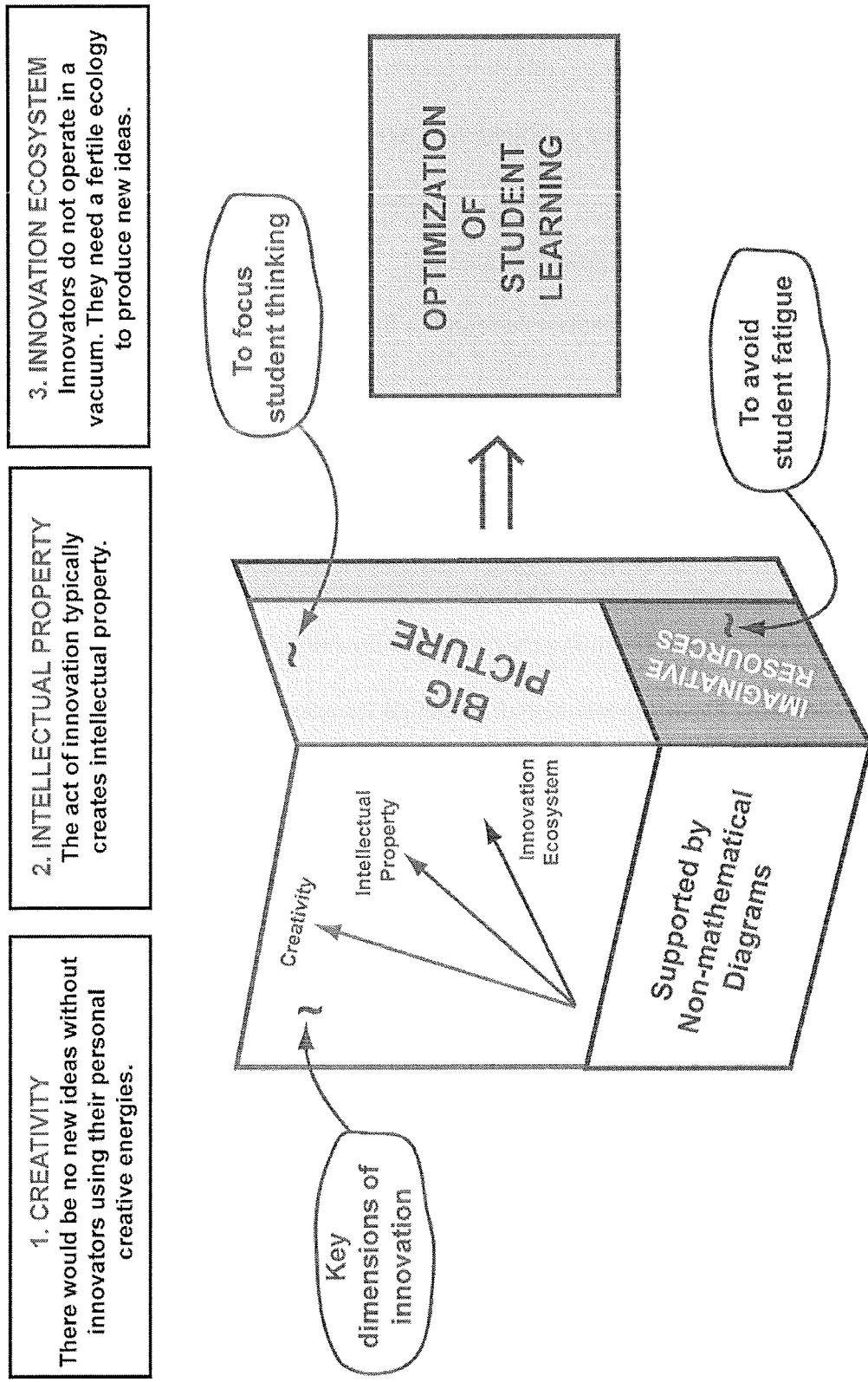


Diagram 1: First Approximation

In each subject field there are *interpretative tools* which summarize what the researchers and practitioners have learned. What these knowledge workers do is to mentally copy the business reality, and in this process, they produce ‘tooled knowledge.’ I believe that it is a primary obligation of a teacher to find ways of helping students to learn interpretative tools, and especially, to help students to learn how to use them in a great variety of problem situations.

The key interpretative tools that can be found in the intellectual tool-kit of business innovation are:

- First principles or 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 or essential building blocks (e.g. innovation, *homo creativus*, creative economy, ideas, human capital, perpetual innovation, creative destruction and innovation costs);
- Insights or penetrating mental visions that guide scientific research; for example, research in innovation theory has shown that the field is unified by five central insights, namely:

Insight #1: The act of innovation consists of reconfiguring old ideas in new ways to produce new ideas;

Insight #2: Innovation is essentially an economic phenomenon, or at least explicable in economic terms;

Insight #3: The act of human innovation is typically imperfectly appropriable;

Insight #4: The existence of intangible inputs renders increasing returns inevitable; and

Insight #5: Ideas and human capital are inherently different products.

These insights recur throughout the study of business innovation and give a compressed overview of the fundamental truths in this field of enquiry.<sup>3</sup>

- Conceptual frameworks or intellectual constructs for organizing thinking about a problem (e.g. recombinant model of the creative economy, ecology of the creative economy, innovation life cycle, and Porter model of international competitive advantage);
- Underlying assumptions or conditional clauses that are not continually repeated, but they are required for the validity of the arguments (there exists economic freedom, innovators pursue a combination of the *three Fs* fortune, fame and freedom, etc.);
- Paradoxes or statements seemingly self-contradictory, but explicable as expressing a truth (e.g. the efficient firm's dilemma and the innovator's dilemma); and
- Ongoing debates or opposing views concerning a particular awkward question (Is economic evolution continuous or discontinuous? Is DNA patenting ethically acceptable? etc.)

Note, then, that an interpretative tool can manifest itself in various facets. For example, the concept of innovation defined as a new idea appears in the majority of the remaining tools.

What distinguishes a knowledgeable analyst from all other people who talk and write about business innovation is a command of analytical elements that I have termed 'interpretative tools.' Diagram 2 puts together the seven tools or facets necessary to comprehend business innovation and illustrates each facet with a specific example of the current understandings.

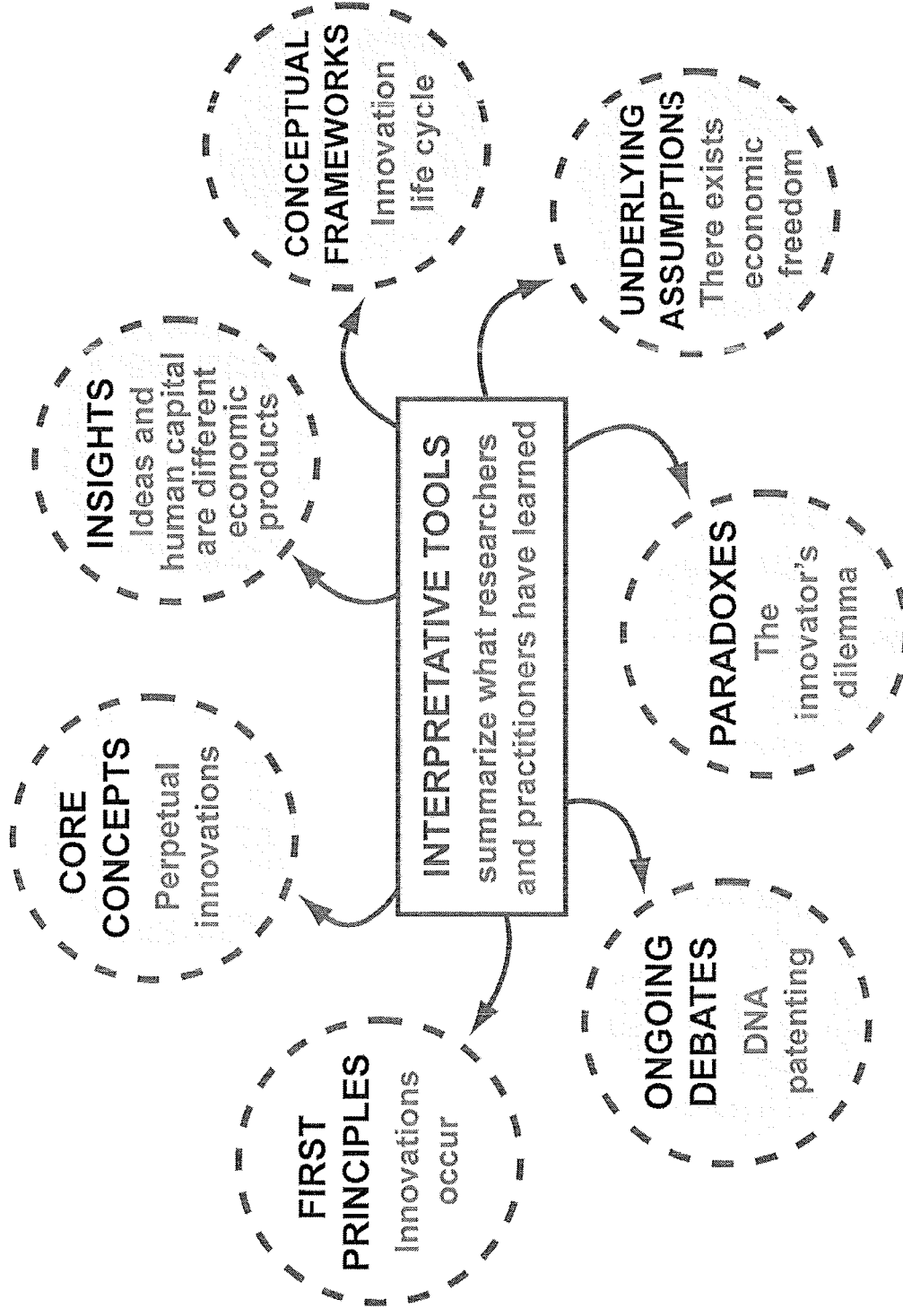


Diagram 2: Second Approximation

### THIRD APPROXIMATION: THRESHOLD CONCEPTS

The purpose of third approximation is 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. This approximation is a refinement of the second approximation. We now 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.’<sup>4</sup>

#### Threshold Concepts Defined

Educators and students are familiar with terms such as ‘core concepts’ (e.g. demand and supply curves) 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. Learners who are able to absorb threshold concepts will 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.

Put it another way, 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.<sup>5</sup>

### **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.<sup>6</sup> A brief description of these terms is in order.

#### ● Ideas and Human Capital<sup>7</sup>

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.

Before going on to the description of additional threshold concepts, it is convenient to make two points. First, 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’. Second, threshold concepts typically 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<sup>8</sup>

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 her new idea in just one page. 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.<sup>9</sup>

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).<sup>10</sup> 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<sup>11</sup>

Sometimes threshold concepts do not come as a single concept but as a 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.

*Sustaining innovations* improve the performance of established products. These kinds of innovation give 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. The archetypal example of sustaining innovation is Toyota’s innovation philosophy of Kaizen or continuous improvement, namely: creative workers are constantly proposing changes that perpetually bring the manufacturing process close to perfection.

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 practical applications 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.

### **Section Summary and Remarks**

Concepts such as ideas, human capital, non-rivalry, sustaining-disruptive innovations, increasing returns to feedback, commoditization, and mega-invention, are included in the set of threshold concepts because they 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.

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

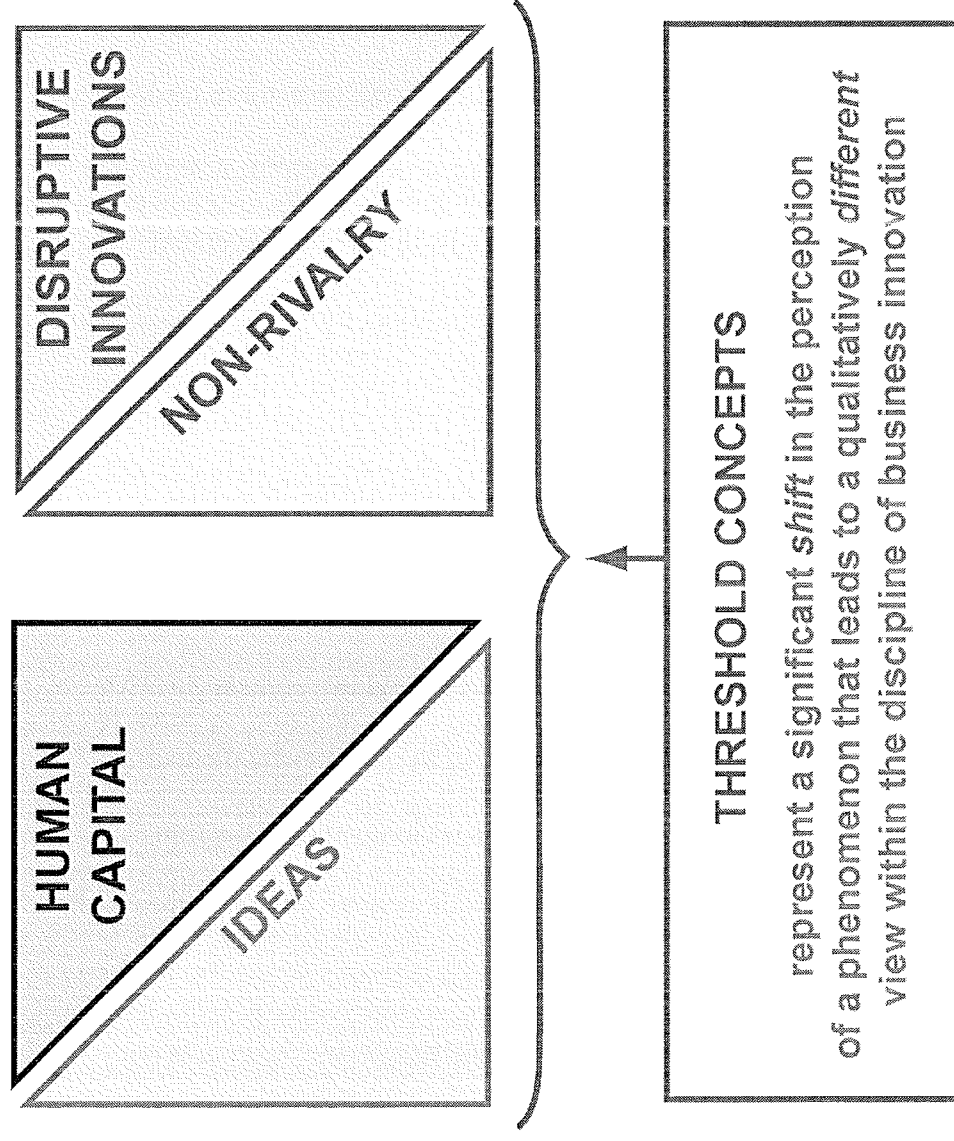


Diagram 3: Third Approximation

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’ (or ‘successful innovation’) 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 model of international competitive advantage due to Michael E. Porter (1990) illustrates this point.<sup>12</sup> This model 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 model is a transformative gateway that enables us to see international trade as driven by cumulative processes of innovation and diffusion of knowledge.

At other times, when threshold concepts are embedded in theoretical frameworks, it may be possible to derive new threshold results, that is, implications that challenge our intuitive understanding in a fundamental way.<sup>13</sup> For example, from the premise that ideas are non-rival and at least partially excludable, it can be (logically) shown that economic growth is boundless.<sup>14</sup>

## **ILLUSTRATING THE STRATEGY**

Before going on into the final section of this paper, it will be well to illustrate the thread of the suggested teaching and learning method. To show how some aspects of the subject would move through the approximations, it helps to start with a few working definitions. It is generally agreed that business innovation consists of the creation of new ideas with the intention of making money. If the new ideas are conducive to the creation of new products or processes, analysts say that business innovation consists of technological innovation. Otherwise, business innovation is termed organizational innovation; for example, the creation of a new business model is an organizational innovation.

From the preceding definitions it follows at once that ‘creativity’ is a key dimension of our field of study. When creativity is applied to producing ideas with economic value, there is the potential to generate increasing levels of welfare. We can gain an understanding of business innovation by moving along Dimension 1 (see Diagram 1) and introduce a collection of interpretative tools. We consider the fact that innovations occur as a first principle. Somewhat loosely, we can say that the creation of new ideas (be it in the arts, mathematics, marketing or anything else) occurs by combining existing ideas into different new ideas (Insight #1). To advance in the teaching and learning of our subject we can (for example) approach ‘creation’ from an economic perspective, and define two concepts. *Economic ideas* are ideas with economic value (economic ideas are intangible products). Furthermore, economic ideas that in fact earn money are called *profitable new ideas*.

Questions such as

Question ①: Can the creation of economic ideas ever come to an end?

Question ②: What is the prime mover of the creation of economic ideas?

Question ③: What sustains economic growth in a physical world pervaded by scarcity and diminishing returns?

can be appropriately addressed by using the existing intellectual tool-kit of business innovation. It would take me too far afield to attempt an answer to these questions. However, the starting points of the answers can be sketched as follows.

Question ①: Existing ideas are reconfigured into new ideas that themselves have the possibility of later becoming reconfigured into yet new ideas (insight #1);

Question ②: The profit motive is the prime mover of the creation of economic ideas (insight #2); and

Question ③: Insights #1 to #5 can be integrated in a general equilibrium model able to answer this question.<sup>15</sup>

Before leaving the second approximation, a quick digression may be useful. Given the inherent complexity of business innovation as a field of study, it is not surprising that there are numerous byways and diversions along a particular route, i.e. it is always possible to change dimensions. To see this, assume that the ‘particular route’ consists of studying economic ideas. Two points can be made. First, protecting economic ideas is becoming increasingly important in the innovation age (if the innovation can be imitated, it is obvious that self-interested individuals will not have incentives to innovate). This leads naturally to Dimension 2 (Intellectual Property). Second, if there is a lesson to be learned from the history of innovation is that the ‘national circumstances’ can contribute to or detract from business innovation. The dimension called Innovation Ecosystem (Dimension 3) captures the national circumstances in a stylized way. I am not going to explore Dimensions 2 and 3 here.<sup>16</sup> My experience in the classroom has been that the method of ‘one dimension at a time’ works exceedingly well, but I am not trying to be prescriptive here.

Now that our students have some understanding of the importance of ideas as economic products, we can tell them that 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 over and over again simultaneously by many people (e.g. a design for a new diamond ring can be published on the Internet and used by one person without reducing the ability of another person to use the same design). This attribute, technically called ‘non-rivalry’, tends to have stunning effects on novices.<sup>17</sup>

Another core concept which tends to have a profound impact on novices is ‘innovation costs’, that is, the cost of producing new ideas. The cost of creating a new idea is a one-time cost: an idea needs to be created once.<sup>18</sup> This implies that the innovation costs incurred in order to produce the first unit of the new product tend to be high in comparison

with the cost of subsequent units. For example, the first disk of Windows to go out the door cost Microsoft US\$50 million, the second and subsequent disks cost US\$3!

Clearly, ‘innovation costs’ is a threshold concept. This example also illustrates the fact that a threshold concept need not be difficult to grasp. There are many threshold concepts in business innovation that lead students to say: “This is fascinating! Why didn’t I think of it? It’s so simple!”

I hope that the essence of the method of teaching and learning business innovation by successive approximations has been conveyed by the preceding illustrations and the reader has now a taste of what is the strategy all about.

## **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. This paper suggests an organizing framework for teaching and learning business innovation at the undergraduate level. The general focus of the proposal is to provide teachers and students with a systematic approach to this rapidly evolving field.

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 12 weeks of the whole 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.

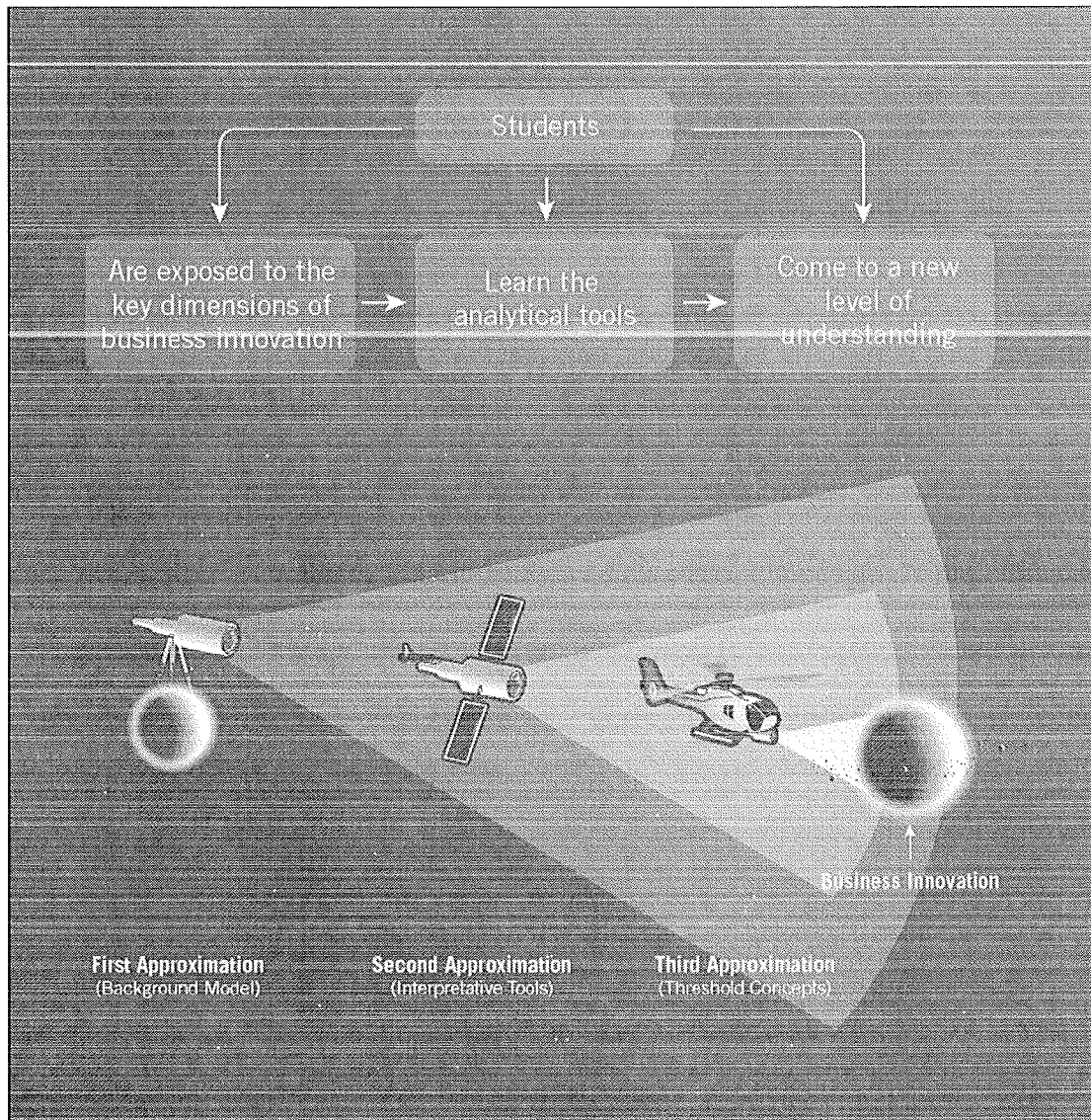


Diagram 4: Strategy Grand View



## APPENDIX: STUDENT FEEDBACK<sup>19</sup>

The strategy for teaching and learning business innovation described in this paper was tested through a mini-survey in four consecutive sessions during 2007/2008 in the subject COMM 327: Business Innovation, Technology and Policy. The mini-surveys were distributed among the students at the beginning of each session and had a deadline close to the end of the session. All students were asked to provide feedback on a voluntary basis.

In the first lecture of each university session, I summarized the three approximations using PowerPoint slides together with the same four diagrams included in this paper and the students received a mini-survey with several questions revolving around the strategy in question. All students had electronic access to these materials. Furthermore, in the first lecture as well as in the first tutorial students were asked to reflect during the whole university session (approximately 3 months) about the usefulness of the strategy.

There were three specific questions included in the mini-surveys specifically related to the teaching-learning strategy described in the present paper.

### Question 1

**The fact that I am aware of the method of teaching employed in this subject has had beneficial effects on my understanding of the subject matter.**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

### Question 2

**The Background Model together with the non-mathematical diagrams summarizing the main points of specific topics has significantly helped my learning process throughout the session.**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

### Question 3 (Explain briefly)

**Do you think that it is important for students to know the teaching and learning strategy *underlying* the development of a subject? Why or why not? Please, explain briefly.**

Student feedback has been generally positive. As an illustration, I use the mini-survey implemented in the Autumn Session 2008. There were 312 students enrolled in COMM 327. The rate of response was 27%. The results concerning Question 1 are revealing.

**Question 1:**

	No. of Respondents	% of Respondents
Strongly Disagree	3	4%
Disagree	7	8%
Undecided	8	9%
Agree	55	65%
Strongly Agree	12	14%
<i>Total</i>	<i>85</i>	<i>100%</i>

Table 1

A glance at Table 1 shows overwhelming support for students experiencing positive effects in understanding the subject matter as a result of being aware of the teaching and learning method employed: 79% of respondents enjoyed beneficial learning effects. Some reasons underpinning this outcome are pinpointed by the answers given in Question 3 below. These include aspects such as an increased sense of security in understanding the aims of the subject, increased confidence of the organisation of the subject and a more vivid perception of the current and future value of the subject by the student.

**Question 2:**

	No. of Respondents	% of Respondents
Strongly Disagree	3	4%
Disagree	6	7%
Undecided	4	5%
Agree	45	53%
Strongly Agree	27	32%
<i>Total</i>	<i>85</i>	<i>100%</i>

Table 2

The results from Question 2, demonstrate that The Background Model together with the non-mathematical diagrams have significantly helped the learning process of over 80% of students who responded to this survey (see Table 2). Reasons for this may include better

clarity of concepts and how they interrelate and form the subject as a whole as well as avoiding the apprehension and confusion that may come about with the use of mathematics.<sup>20</sup>

### **Question 3:**

Answers to Question 3 were generally positive as demonstrated by the following opinions:

① Yes, I think that it is important to know the teaching and learning strategy underlying the development of a subject because in that way the teacher and the students are working in the same way to get better results in the learning process.

② Yes, so students can see what the lecturer is getting at and it is easier/more interesting when doing a subject when you can see how the content interlinks (not thinking you are being taught pointless things that have no relevance).

③ Yes. I believe it is important for students to know the teaching & learning strategy underlying the development of a subject as it assists in putting the pieces together as a whole. It fills in the blanks & helps understand where the lecturer is making them point. I have taken in more content in this subject than any other subject.

④ Yes. Students can understand straight away how the subject is going to be taught. Students can then better understand the topics to be taught, and can easily ask questions if they have a problem. I do think it is important to know the teaching and learning strategy underlying the development of a subject as it gives us a clearer understanding of the subject, and what it will entail. By knowing the teaching and learning strategy of the subject, we will get a better understanding of the overall subject.

---

<sup>1</sup> 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).

<sup>2</sup> 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*.

<sup>3</sup> The sources of the above mentioned insights can be found in (Pol and Carroll 2007, p. 73).

<sup>4</sup> The notion of ‘threshold concept’ was introduced by Jan H. F. Meyer. See Meyer and Land (2006).

<sup>5</sup> A detailed treatment of the notion of opportunity cost can be found in (Pol and Carroll 2006, Appendix A to Chapter 2).

<sup>6</sup> These illustrative examples do not exhaust the list of conceptual understandings that have a transformative effect on novices: ‘increasing returns to feedback’, ‘commoditization’ and ‘mega-invention’ are also threshold concepts. For a definition of these terms see Pol and Carroll (2007, p. 142, p. 151 and p. 166, respectively).

<sup>7</sup> The separation of ideas from human capital is due to Romer (1990).

<sup>8</sup> The concept of non-rivalry was introduced by Romer (1990).

<sup>9</sup> Enforcing 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.

<sup>10</sup> Specific elements included in the collection of intangible assets are intellectual property rights such as patents, copyrights, trade secrets, and trademarks.

<sup>11</sup> This dichotomy was introduced by (Christensen, 1997).

<sup>12</sup> For a pictorial description of the Porter model, see (Pol and Carroll 2007, Diagram 9, p. 101).

<sup>13</sup> This subtle issue does not appear to have been recognized in the literature on threshold concepts. The general proposition that I have in mind is as follows: the derivation of ‘threshold implications’ presupposes that at least one threshold concept must be present in the premises of the deductive reasoning. Or, to put it differently, when threshold concepts are embedded in a rigorous theoretical framework, they may produce some surprising implications.

<sup>14</sup> The intuition behind unbounded growth is that a creative economy resembles a machine of perpetual innovation. See Romer (1990).

<sup>15</sup> For more details and references, see Pol and Carroll (2007, esp. Ch. 2).

<sup>16</sup> For an explanation of Dimension 2, including different types of intellectual property rights, see Pol and Carroll (2007, esp. pp. 60-70). This book also presents a systematic treatment of Dimension 3 in Chapter 3.

<sup>17</sup> The first time I read this peculiar attribute in the seminal Romer (1990) paper, I did experience the mesmerising effect of a ‘threshold concept.’ I mention, in passing, that the notion of threshold concept did not exist at that time.

<sup>18</sup> Notice that this issue is logically separated from the above discussion of the fact that ideas are non-rival products.

---

<sup>19</sup> The data presented in this appendix was collated by Ms Grazia Zappia, a former COMM 327 student and COMM 327 tutor during 2007-2008.

<sup>20</sup> Like Question 1, there is a proportion of students who are undecided or who disagree with the usefulness of the strategy to some extent, probably because they feel that they do not need any guidance to learn business innovation.

