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What's New? Innovating the Teaching of Innovation Law

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The human resource component is a critical bridge between IPR protection, innovation promotion, and economic development. This paper reviews efforts to create a replicable model for teaching IP and innovation law based upon two decades of building and teaching such a curriculum in the United States to law students, scientists and engineers, business managers, and government officials. One broad point of emphasis is the importance of the cross-disciplinary classroom (equally addressing the needs and interests of those groups of students) for the development of a cadre of 'IP professionals'. But development of an IP profession, standing alone, is inadequate. Hence, the second point of emphasis is the need to impart highly specialized transactional, managerial, and negotiation skills, to turn 'IP professionals' into true 'innovation professionals' who can serve as a platform for a truly indigenous and self-perpetuating 'infrastructure of innovation'.

Keywords: Innovation law, TRIPS, license agreement, intellectual assets

The greatest invention of the 19th Century was the invention of the method of invention.

Alfred N Whitehead, Science and the Modern World (1925).

Are Robust Intellectual Property Laws a Necessary Condition for Innovation?

Channeling the power of innovation is a fundamental necessity in the global information and environmental ecosystems in which we live.[1] Rapid radical transformations in our virtual and physical ecosystems challenge the real capacity of human societies to respond effectively. Human society is in a race between opportunities and threats. The information 'opportunity' includes the global communications and transportation revolutions, convergence of technology and information, and prospects of a 'real-time' global civil society where benefits flow to all states and all peoples. The physical 'threat' includes the consequences of finding ways of feeding and caring for exploding human populations, fighting global pandemics such as HIV/AIDS, SARS, avian flu and malaria, preventing conflicts over resources (and the concomitant ethnic conflicts that ensue), reducing the human impact on the environment, preserving the traditions that give our lives spiritual sustenance and meaning, and confronting the unavoidable cultural dislocations engendered by our ascent (or is it descent?) into modernity. These threaten our very existence on the planet. The demands of economic development, driven by growth in human populations and disparities in material well being made ever more visible due to modern communications, are not to be overlooked. Can we win the 'human race'? Not without innovation.[2]

A critical component in meeting the innovation challenge is educating innovators – the 'human capital' of the knowledge economy – in how to carry out their mission of channeling its power through law. Just as Edison's research park transformed the 'method of invention' from individual to collective goal-driven effort in the 19th century (described in Whitehead's laudatory epigram above), the challenges of the 21st century require us to systematize, rationalize, and improve the teaching of innovation law by expanding scope and improving focus of what we teach, reflecting upon and, indeed, questioning unflinchingly how we teach, and redirecting our efforts in identifying the target audiences for whom we teach.

One oft-raised lurking question is not included above because it has already been answered - not completely but sufficiently for my purposes: Is a robust IPR system necessary to promote innovation? That the most obvious goal of modern innovation policy is economic development through the creation of new wealth and its subsequent diffusion is given for this discussion.[3] Indeed, the received wisdom for this writer as to the basis for legal frameworks

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designed to nurture innovation is that they lead to the creation of wealth for all – not just for the innovator. Such was the tenor of the language used by the drafters of the US Constitution over two centuries ago in granting the Congress the power to protect the work products of authors and inventors through intellectual property rights.[4]

What was once but an inchoate 'conviction' of the Founders of the United States, legislators, and judges over the past two centuries has now been empirically demonstrated by economic theory. According to a recent report of *The Economist*, intangible assets have shot up from 20 percent of the value of companies in the S&P 500 in 1980 to around 70 percent today.[5] Intellectual property is the 'core' of the knowledge economy because, as it has been said, 'it is the most tangible of the intangibles'.[6]

'New growth' or 'endogenous growth' (neo-Schumpeterian) economists maintain that we can best explain modern economic development by redirecting our theoretical focus from traditional physical capital to human capital (knowledge production) and from 'perfect' competition to 'imperfect' competition (market interventions) designed to foster technological innovation.[7] Unsurprisingly, these 'new growth' economists endlessly argue over the extent to which 'monopoly profits motivate innovation;' but more important for my discussion is their observation that 'people with human capital migrate from places where it is scarce to places where it is abundant.'[8]

In the first two thirds of the 20th century at least, market intervention in the form of strong IPR protection in the United States was not popular public policy. A vivid illustration appears in a dissenting opinion by a Supreme Court justice in a 1949 patent case. Justice Robert Jackson wryly observed, 'the only patent that is valid is one which this Court has not been able to get its hands on.'[9] That was in an era when technological competition in the United States market was primarily between domestic firms in the national economy. Not until the late 1970's did the US Congress became energized (perhaps 'rabid' is a better description) about 'strong IP protection' in the face of growing technological competition from Japan.[10] What has ensued since 1980 has sometimes been called the global 'Pro-Patent Era' or the 'Golden Age of Intellectual Property', driven by the United States both internally and externally.[11]

For over a century, harmonization of intellectual property laws among the developed countries had always been a slow and painful process, and remains so.[12] But the advent of the US-led push for the World Trade Organization's TRIPS Agreement intended to incorporate the developing countries into a 'world intellectual property system' has compounded the controversy over the nature, suitability, and scope of IPRs in an increasingly globalized technology market. [13] Economists who are harsh critics of the TRIPS Agreement generally still accept the basic premise that in a world of imperfect competition, market intervention in favour of innovation works in developed countries, and that IPR protection is a necessary component of innovation policy. For example, one perennial critic of the TRIPS Agreement and of the 'new growth' economists, former World Bank Chief Economist and Nobel Laureate, Joseph Stiglitz, recently stated:

> 'intellectual property is important, but the intellectual property regime for a developing country is different from that for an advanced industrial country. The TRIPS scheme failed to recognize this. In fact, intellectual property should never have been included in a trade agreement, at least partly because its regulation is beyond the competency of trade negotiators.'[14]

Dr Stiglitz is entitled to his opinion that it is necessary to modify already existing TRIPS standards to meet the needs of a particular developing country, but he does not deny the importance of IPRs to developed ones. What is missing in Stiglitz' premise, even if it is true, is an explanation of how a 'developing' country could ever become a 'developed' one if IPR protection remains weak? How are developing countries ever going to catch up? Or should developing countries relegate themselves to the perpetual role of 'fair followers' and accept (or demand) crumbs from the tables of their wealthier trading partners?

We cannot deny that the decade-old TRIPS treaty is now a fact of life for all of the 149 member states of the World Trade Organization (WTO). Over the past decade, some of the most significant WTO member developing economies – including China and India – have greatly modified their laws to comply with the

TRIPS Agreement and are well beyond 'the point of no return' to the old days of autarky, import substitution, and self-absorption. Pressure to reform IPR systems in developing countries continues to come from foreign governments, primarily the United States, and the private firms whose interests it represents.[15] And increasingly, the European Union countries have begun to become more active in pressuring for stronger IP laws in their developing country trading partners.[16] External pressure for reform has also come from the more neutral and principle-based decisions of the Dispute Settlement Body of the WTO.[17] There is no dearth of external pressure on developing countries to reform their IPR systems.

But equally, if not more importantly, it is for internal reasons that a significant number of developing economies such as China, India, Chile and Mexico are well along the way in the process of adopting many of the growth-oriented policies touted by endogenous growth economists such as Romer.[18] In so doing, they appear to be emulating the smaller 'economic tigers' of Asia (South Korea, Taiwan, Hong Kong, and Singapore) in a game of 'catch-up,' just as those countries emulated Japan's 'catch-up game' a generation ago.[19] Recent studies indicate that in the 'catch-up' game, Asian and some European countries (Portugal and Ireland, in particular), are moving ahead, while Latin American countries are falling behind.[20] (This may be an indication of the relative weight of internal versus international politics in national decision-making.)

Key to the 'catch-up' game is investment by developing countries in innovation education. Validating Romer's assertion that 'people with human capital migrate from places where it is scarce to places where it is abundant,' growth-oriented developing countries are luring their own highly educated 'indigenous human capital' back from the United States and other developed countries to which they had gone to acquire advanced study, or earlier emigrated in search of better economic opportunities.[21] The integrative transformation of the global economy during the WTO's first decade parallels a rapid transformation of intellectual property systems and the emergence of an incipient infrastructure of innovation in some (but not all) developing countries. That a radical transformation of the (admittedly small and homogenous) 'knowledge economies' of Ireland, Korea, Taiwan, and Singapore, from their former role as pirates seeking access to technology created elsewhere to 'knowledge economies' producing innovation in their own right is now well underway is not to be denied.[22] To a large extent, local professionals returning from developed countries where they received advanced education and professional experience in innovation strategies are the drivers of this knowledge production. The 'North-South' IPR debate goes on. But for developing countries which aspire to catch up, as opposed to those that are willing to settle for continued hand-outs, the central question is not the debate about whether developing countries should or should not adopt strong IPR protection – it is how to teach their own talented people the ways in which IPRs work in the advanced developed countries.

The discussion that follows assumes without further examination that while the questions 'why innovation is important?' and 'what is the appropriate scope of IPRs in developing countries' remains significant for research and policy development, such questions cannot be answered adequately or even evaluated correctly unless the researcher or policy-maker seeking answers and doing the evaluation fully understands how IPRs work in developed economies. Superficial (and usually purely academic) knowledge of IPRs and a studied uninterest in how IPRs actually work in developed countries makes for easy, facile, and usually unfounded criticism.

The discussion also assumes that even if strong IPR protection needs adjustment in some developing countries in derogation from the higher IPR standards of developed countries, innovators in developing countries still need to have a deep understanding not so much of why innovation works in developed countries, where IP systems are robust, but how it works in them. The goal of the discussion is to attempt to explore how to foster a global 'infrastructure of innovation' by building a global cadre of professionals for the creation and management of innovation. The section below sets out a few variables in the process of innovation education based upon two decades engaged in the inquiry as an educator at the graduate level.

The Cross-Disciplinary Classroom

Teaching Law Students and Technology Professionals to become 'Intellectual Property Professionals'

'Many social phenomena are too complex

> *to be analysed properly from a single disciplinary perspective. Arguably, innovation is a prime example of this.'*[23]

As research on innovation over the past 30 years has become more cross-disciplinary, so has the innovation classroom.[24] Innovation and innovation education go hand in hand in what has recently been called a process of 'coevolution.'

> [W]ith the emergence of science based industries over a century ago, the need for an infrastructure that suitably supports relevant education, skill formation, and training became critical to the competitiveness of industries, and is widely believed to have become more important still in the modern techno-socio-economic paradigm associated with computerization and information processing. For firms to be able to create capabilities requires costly and difficult internal learning processes, but these in their turn depend upon having suitable organizational and technical skills in the management and workforce on which they rely. The composition of skills in the workforce of the home base of firms is therefore critical to the success or failure of countries that are trying to catch up, but it also becomes a central influence upon the fields in which any national group of firms has its specific pattern of comparative advantage in innovation and capability creation. Of course, this is not just a one-way street, since the types of investments and commitments to training that are made by firms themselves in the course of learning, the professional associations they help to form, and the pressures they place upon governments and others imply again a process of coevolution between firms and their environment in this respect.[25]

The 'innovation classrooms' of the 19th and early 20th centuries were primarily self-teaching environments, apprenticeships and on-the-job training. In the United States, the Patent Act of 1836 established the Patent Office and the examination system, beginning the system of hiring technically trained patent examiners, as we know it today.[26]

The patent examiner's experience acquired in the Patent Office was the traditional source of core competency training for large number of patent solicitors and patent attorneys, many of whom learned the ins and outs of the profession as patent examiners while they attended law school at night, or left the patent office to attend law school after a few years.[27] The Patent Office in the United States has long provided financial and other support for its patent examiners to attend law school and continues to do so today. It is an apparent irony that many patent examiners who have benefited from legal training ultimately leave the examining corps for more lucrative careers in private practice as patent attorneys upon completion of their legal education. In actual fact, however, patent examiners who have become patent lawyers have been the bedrock infrastructure of a highly educated and sophisticated patent solicitor community, providing the critical skills needed for the inventive community in their quest to protect their intellectual property assets – both patents and trademarks.[28]

The formal system of legal education in the United States was itself a later development – the so-called 'Langdell experiment' of Dean Christopher Columbus Langdell at Harvard Law School (HLS) in the 1870's (curiously, contemporary with Edison's Menlo Park activities.) Prior to that, American lawyers had been primarily taught as apprentices in law offices and few had university training. Langdell was a believer that legal education should be self-reflective and 'scientific' because lawyers learning the law from practicing lawyers were not receptive to new ways of looking at the law. Learning law from scholars was deemed superior to learning law from practicing lawyers. The modern system of graduate professional education in law schools in the United States is fundamentally based upon the HLS model.[29]

But from the late 19th century until very recently, 'intellectual property law' as a legitimate object of study and research[30] even among 'scientific' legal academics was rare in the United States. Few American law schools in the 19th and early 20th centuries were fortunate enough to have even one professor competent to teach a course in patent, trademark or copyright law. And more often than not, if a tenured professor taught intellectual property law,

the main area of study was copyright – not the 'industrial property' mainstream of patent and trademark law. 'Industrial property studies' were not worthy of inclusion in Langdell's 'Legal Academy.' More likely, if there were a patent law professor in an American law school, it was a patent practitioner (and sometimes a former patent examiner) who was brought into the law school as an adjunct member of the faculty to cater to a small number of technically trained students rather than a tenured member of the law faculty.

Not until the IPR 'revolution' in the 1970s and 1980s did the two strains of education (of patent agents or solicitors trained as examiners in the Patent Office and of lawyers trained in the law schools) really begin to converge. Since that time, many American law schools have begun to offer courses in intellectual property law, but only a few have approached the project in a systematic way. One is the Franklin Pierce Law Center ('Pierce Law'), founded in 1973 as an independent law school, not attached to a university.[31]

From the start, Pierce Law's patent curriculum focused on the traditions of the practice of patent solicitors going back to the Patent Office and the Patent Act of 1836, not the teaching of law. Beginning in 1979, the patent practice and procedure program at Pierce Law was cross-disciplinary, including both law students and patent examiners who had technical or administrative but no legal training in the same classroom.[32] The object of this curriculum was to instruct all the students in how to draft patent claims and prepare patent applications for submission to the USPTO and, in the process of doing so, to inculcate basic theoretical knowledge of the concepts of patentable subject matter, novelty, nonobviousness, and disclosure requirements from a technological rather than a legal perspective.[31] From its very beginning, the patent practice curriculum was conducted not as a doctrinal course, but as a 'simulation' of the actual experience of patent prosecution and the interaction between the patent solicitor and the patent examiner (The simulation model is still used today.). The course enrolls law students and patent examiners, some of whom have never taken a single law course. Students are handed a technical disclosure at the beginning of the course and required to prepare a series of patent claims that they submit to the instructor, who assumes the role of the patent examiner. The instructor then 'rejects' the claims based upon an assertion of 'lack of novelty' supplying prior art references that purportedly anticipate the invention. The students are then tasked to amend the claims, based upon the prior art, and to write a reasoned response to the 'rejection' by the instructor. The instructor subsequently provides the students with a combination of prior art references and again 'rejects' the claims, asserting this time that they are obvious in the view a person of ordinary skill in the art to which the invention pertains (lack of inventive step). This innovative 'give and take' simulation curriculum is an attempt to improve upon what usually happens when an engineer graduates from law school in the United States without any such preparation and goes to work for a law firm, where he or she 'learns by doing' under the supervision of a senior attorney. The goal of the Pierce Law patent practice curriculum is two-fold. First, it systematizes and rationalizes what had been the random process of learning patent claim drafting and patent application preparation, ordinarily first experienced by an apprentice law firm associate in actual practice. Second, it allowed the 'patent professional' to enter the firms already armed with the skills needed to respond professionally to the procedures of the USPTO, thus shortening the process of 'on-the-job training' (which is extremely cost-ineffective for the law firms).

Subsequent additions to the 'IP skills' curriculum at Pierce Law include a course in 'mining patent information' to teach the patent student basic skills in searching for technology, much as it is done by patent solicitors and examiners. This course also is important for understanding the ownership of patents, trademarks, and copyrights, which may have been assigned by the original owner to a different assignee. Other 'IP skills' courses include US Federal Trademark Registration Practice (practical knowledge for trademark application) and Trademark Opposition (*inter partes*) Practice, including an examination of what sorts of evidence the USPTO Trademark Trial and Appeal Board may consider in trademark opposition proceedings. Such courses have been rarely offered in most American law schools because the 'Langdell model' of American legal education originated at Harvard purports to teach students analytical skills needed to 'think like a lawyer' – not practical skills.[34]

Teaching 'Intellectual Property Professionals' to become 'Innovation Professionals'

The success of the simulation method for teaching the skills of a patent solicitor became evident very early at Pierce Law. Yet acquiring patents and trademarks from the USPTO is only one component in the innovation process. The value of patents is not in their acquisition, which is very expensive (indeed, arguably wasteful); rather, it is in the economic exploitation and commercialization of patents. This requires skills in law (particularly contract law) and management. Beginning in the second decade of the Law Center's existence in the mid-1980s, the simulation method of the patent practice curriculum was extended to new courses in 'technology licensing' and 'intellectual property management.'[35] In the former course, students are introduced to the process of drafting a technology licensing agreement from scratch. This was a revolutionary advance in teaching the basic concepts and practice of technology licensing for many students from both inside and outside the United States. In many developing countries (particularly in that period of the1980s when technology importation was subject to heavy government regulation) 'license agreements' were merely forms prepared by government bureaucrats. In accordance with patent law requirements that technology licenses between foreign technology owners and local parties be submitted to the government for approval, the parties had only to fill in the blanks and submit the document to the relevant government agency for approval or rejection. The only issue for negotiation was the royalty, and it was assumed that the government office would protect the local party from 'oppressive terms.' But in the developed economies of the world, a technology license is not a form of compliance with government regulations; rather, it is a 'private ordering' of the relationship between the parties, to be enforced by the court if a dispute arises. 'Licensing professionals' need to be sensitized to the fact that a true technology license agreement is not the memorialization of a one-time transaction between two unrelated parties, but rather, it is a consent agreement to engage in a long-term relationship, which must be beneficial to all sides if it is to succeed.[36] The definition of the intellectual property to be licensed is one of the most critical terms.[37] So are provisions regarding the scope of the license (exclusive, sole, or non-exclusive, and term). Students are introduced to the concepts of warranties and indemnities from contract law, and educated to understand that the 'reasonable royalty rate' for an exclusive license, for example, or for a license which indemnifies against liability for infringement of a third party's IPRs may be starkly greater than that for a non-exclusive one.

The introduction of a course in 'intellectual property management' was also revolutionary, because many students without professional experience in intellectual property transactions remain under the mistaken assumption that ownership of a patent is itself automatically a form of wealth, when in fact it is only through the exploitation of a patent that wealth is generated. This IP management course (also a simulation) examines in detail the role of an 'intellectual property department' of a corporation. How does the 'IP department' make strategic decisions? How does it convince the management of the corporation (and particularly the finance department) that the costs of IPR protection are an investment in the future and not an expense in the present (the accountant's distinction between a 'balance sheet' and a 'profit-and-loss statement')? How does a company find out what intellectual property assets it has? Inventors and R&D workers do not run to the IP Department with their ideas. The IP Department must constantly query them about their inventive activities. What are the sum total of intangible IP assets of the company? This exercise, conducted as a simulation, requires the student to draft an 'Intellectual Property Audit' reporting not just the IP assets of a company, but the possibility (or even likelihood!) that a product produced by the company might be infringing the IPRs of another company. (And if a company merges with or purchases another company, is it buying an IP 'asset' or purchasing an expensive IP infringement suit?). How do companies decide whether to seek to file a patent application or to keep a technology as a trade secret? How does a company decide to file patent applications in one country and not in another (based upon where its markets and where its competitors are)?

Other offerings in the cross-disciplinary 'innovation' curriculum extend the concept of IPR exploitation into different avenues. One course covers

intellectual property valuation. An issued patent may be an incredibly valuable future asset or it may be worthless. There is no guarantee that an issued patent will bring value to its owner; indeed, in the United States it is estimated that 90 percent of patents never adequately pay for themselves, much less earn money for their owners.[38] Built upon accounting principles rather than legal or technical ones, 'IP Valuation' is a critical skill not only for determining a reasonable royalty rate for a technology license, but also for the IP management decision-making process of determining which inventions are worth seeking patent protection on, which inventions need to be considered for further protection through international patent applications, which are more valuably kept as trade secrets instead of patented (particularly in the chemical, pharmaceutical, and biotech process areas), which patent applications should be abandoned (as the state of the technological art, the nature of competition, and directions of the company evolve in different directions over time), and how to assess damages in an IP infringement suit.

The 'innovation professional' takes on an added cross-disciplinary responsibility as intellectual property owners mature from merely seeking to license their technologies to other companies, to becoming full-fledged entrepreneurs themselves. In addition to the skills of the licensing executive and intellectual property manager mentioned above, the innovation professional may need to become an expert in the practices of those who invest in small, cutting-edge technology companies. This may mean harnessing the legal skills necessary to establish 'start-up' companies and deal knowledgeably with the investment communities. Investors in the Global Technological Age are in a constant search for quality and value. It may take the form of venture capital, or its predecessors (sometimes referred to as 'angel finance'). And because early venture capitalists wish to turn over their investment in a start-up company within a time certain framework (usually three to five years), the 'innovation professional' may need to become conversant in the requirements of highly regulated formal capital markets for the securitization of corporate equity through an initial public offering (IPO). Depending on the degree of government intervention prevalent in a particular country, other forms of capitalization may originate from government entrepreneur assistance programs, government grants and subsidies, or preferential loans from banks with government connections. (The highly 'interventionist' governments of Singapore and Ireland come most readily to mind in this regard).

There is a further aspect to cross-disciplinary studies to create 'innovation professionals' that needs to be considered. Whether it is termed protection of 'intellectual property', 'intellectual assets', or 'intellectual capital', the differences in customary practices between one 'knowledge industry' and another may be stark. For example, as already alluded to above, a knowledge of trade secret protection and a facility in analyzing what assets may be protected as patents and what should be preserved as trade secrets are much more important in the chemical, pharmaceutical, and biotechnology industries than in machine tool or computer industries where reverse engineering is the norm. Another quite different example is the practice of intellectual property protection in media and entertainment industries, where, in the first instance, the convergence of technology and content create unique challenges, and in the second instance, the relationships between the major economic actors may be regulated more through private contracts than through the public law of intellectual property rights.[39]

Finally, there are the most exciting new areas of innovation teaching in the fields of 'technology commercialization,' 'technology diffusion' at the interface between profit and non-profit institutions, and in the 'open source' movements. The first refers to 'non-profit to profit' transfer of technology. There has been a dramatic growth in the commercialization of university and non-profit institute-generated technologies supported by US government funding since the Bayh-Dole Act of 1980 first reversed the presumption of title so that such universities and other non-profit research institutes receiving government funding to support research may choose (but are not obliged) to seek IP protection in their own names for the technologies arising from such research. Innovation professionals in universities and research institutes need to understand the entire process of 'technology commercialization.'[40]

The second refers to 'profit to non-profit' transfer of technology in consequence of the revolutionary developments in the international distribution of HIV/AIDS/malaria drugs mediated by the WTO's

Council for TRIPS since the adoption of the Declaration on the TRIPS Agreement and public health by the WTO at the Fourth Ministerial Conference in 2001, its implementation at the Fifth Ministerial in 2003, and the formal amendment of the TRIPS Agreement (Article 31bis) at the Sixth Ministerial in Hong Kong in 2005.[41] There is a dearth of knowledge about how non-profit NGOs in countries ravaged by these diseases can acquire access to medicines, and how they can interact with foundations such as the Bill and Melinda Gates Foundation that are providing funding for such transfers. Creative funding arrangements for transfer of the most advanced technologies for the benefit of the poor sufferers of these ravaging illnesses in developing countries require 'innovation professionals' who have sophisticated understanding of the rules of technology licensing, valuation, parallel importation (and reimportation!), trademarks, labeling requirements, and drug approvals.

Finally, the 'open source' movement, both in information technologies and in access to medicines, deserves serious educational attention. 'Open source' neither embraces nor opposes intellectual property rights. It is the 'third path'. It is a useful concept both from the standpoint of the traditional 'open source' licensing arrangements in the computer software field, and in the more forward-looking 'open source' arrangements in technology transfer for research on health issues. The extent, to which parties may volunteer to share their IP rights with others in exchange for a return share in IP rights, or forgo IP rights with others in exchange for similar forbearance, deserves serious academic and scholarly attention. This is a chart to the future of innovation teaching, but the coordinates of the trajectory to that future are already in place.

Conclusion

Much of the discourse over the role played by IPRs in the global economy, consuming the considerable energies and talents of the best minds in the field, remains mired in a polarized and sterile (indeed stultifying) debate – a 'dialogue of the deaf' – between IPR proponents who see only the promise of robust IPR protection as an engine of economic growth and IPR opponents who see only the threat of IPR protection to the health and well-being of peoples in developing countries.[42] In the emergent global innovation infrastructure, strong IPR protection, and 'free access' or 'the public domain' are not diametric opposites to be embraced or rejected wholesale, except for those who are more interested in the prominence of their own personal role and 'celebrity' in the debate than in concrete results. Developed and developing countries alike still need to examine, pick and choose their IPR policies based upon local economic and social conditions. The focus of this article is not to question what individual societies should choose as their intellectual property policy at all. Rather, it asserts that intelligent choice requires a comprehensive, concrete, and sophisticated understanding of how IPRs work. Furthermore, the policy choices to be made between different forms of IP protection and between different levels of protection, between 'traditional' IP (protection of patents, trade secrets, trademarks, copyrights) and 'new' IP (protection of traditional knowledge, expressions of folklore, genetic resources, etc.) constitute a spectrum or even a 'rainbow' of policy choices rather than a categorical choice between wholesale adoption or outright rejection.[43] Innovating the teaching of innovation law requires all of us to get beyond the why's and focus on the how's.

Acknowledgement

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References

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2 Rines Robert H, Create or perish: the case for inventions and patents (Washington, DC 1969) Dr Rines is the founder of Franklin Pierce Law Center.

3 Romer Paul, The origins of endogenous growth, *The Journal of Economic Perspectives,* 8(1) (Winter 1994) 3-22, 20-21 '[I]f we make use of all of the available evidence, economists can move beyond [neoclassical] models and begin once again to make progress toward a complete understanding of the determinants of long-run economic success. Ultimately, this will put us in position to offer policy-makers something more insightful than the standard neoclassical prescription – more saving and more schooling. We will be able to address the most important policy questions about growth: In a developing country, what are the best institutional arrangements for gaining access to the knowledge that already exists in the rest of the world. In a country like the

United States, what are the best institutional arrangements for encouraging production and use of new knowledge?' In the same article, Romer repeats his earlier (1986) denial of the 'two central assumptions of the neoclassical model: that technological change is exogenous and that the same technological opportunities are available in all countries of the world.' p.4.

4 'Congress shall have the Power…For the Promotion of Progress of Science and the Useful Arts, to Secure to Authors and Inventors, for Limited Times only, the Exclusive Right to their Writings and Discoveries.' US Constitution Article I, Section 8, Clause 8. Quoting Justice Holmes, The US Supreme Court in its recent *Eldred* decision provides an explanation of the basis for the Congressional power which transcends fashionable economic theory: 'To comprehend the scope of Congress' power under the Copyright Clause, 'a page of history is worth a volume of logic.' *Eldred* p. 200.

5 'Survey of talent: The battle for brainpower', *The Economist*, 7 October 2006, p. 4.

6 Al-Ali Nermein, Comprehensive Intellectual Capital Management (Wiley 2003) p. 139.

7 Romer Paul, The origins of endogenous growth, *The Journal of Economic Perspectives* 8(1) (Winter 1994) 3-22, 20-21 at 21 provides a list of possible market interventions. 'We will be able to rejoin the ongoing policy debates about tax subsidies for private research, antitrust exemptions for research joint ventures, the activities of multinational firms, the effects of government procurement, the feedback between trade policy and innovation, the scope of protection for intellectual property rights, the links between private firms and universities, the mechanisms for selecting the research areas that receive public support, and the costs and benefits of explicit government-led technology policy'.

8 Romer Paul, The origins of endogenous growth, *The Journal of Economic Perspectives,* 8(1) (Winter 1994) 3-22, 20-21, 19.

9 *Jungerson* v *Ostby & Barton*, 335 US 550 (1949) In 1900, Thomas Edison is quoted to have said, 'There is no such thing in this country as an inventor's monopoly. The moment he invents something that is an epoch-maker the world of science and commerce, there will be pirates who spring up on all sides and contest his rights to his ideas.' Thirty years later, Edison remarked: 'Counting the expense of experimenting and fighting for my claims in Court, these patents have cost me more than they have returned to me in royalties. We have a miserable system in the United States for protecting inventions from infringement. I have known several inventors who were poor. Their ideas would have made them millionaires, but they were kept poor by the pirates who were allowed through our very faulty system of protection to usurp their rights'. Rines (1969) at p. 108.

10 *Analyses of President Carter's Initiatives in Industrial Innovation and Economic Revitalization,* prepared by the Subcommittee on Science, Research and Technology of the Committee on Science and Technology, US House of Representatives, (Ninety-Sixth Congress, Second Session) (December 1980) 'Because of mounting public concern about declining innovation and productivity, a [US] Presidential Commission on Industrial Innovation was formed in 1978 to study and recommend solutions. The commission's report, issued in 1980, featured proposals that would facilitate the transfer of scientific and technical information among business, government, universities, and private research organizations; modifications in antitrust, patent, environmental, and federal procurement policies; financial support for small companies engaged in developing new technologies; and facilities for broad efforts at technology development by private corporations, universities, and government agencies'. Steckmest Francis W, Corporate Performance: The Key to Public Trust (2002) p. 125. http://wean1.ulib.org/Books-Finished/Corporate_Performance/TXT/00000138.txt (20 August 2006) 'National Science Policy and Technological Innovation', *The Positive Sum Strategy: Harnessing Technology for Economic Growth,* National Academy of Sciences (1986) http://fermat.nap.edu/books/0309036305/html pp 119-168.

11 Granstrand Ove, *Innovation and Intellectual Property Rights*. Fagerberg *et al* (eds), *The Oxford Handbook of Innovation,* 2006 pp 273-278.

12 Kaufer Erich, *The Economics of the Patent System* 1989 p. 2-10 and Kronstein Heinrich and Till Irene, *A reevaluation of the International Patent Convention Law and Contemporary Problems,* (12) 765-781 (1947) provide good summaries of the development of the international patent system prior to World War II. The current debate between 'new' countries such as the United States or Australia and the 'old' countries of Europe over the form and scope of protection of 'geographical indications' under the TRIPS Agreement is an illustration of this difficulty at the present time. http://www.wto.org/english/tratop_e/trips_e/gi_e.htm.

13 The US also increasingly uses bilateral and plurilateral free trade agreements (FTAs) to boost IPR protection in some of its developing nation trading partners to 'TRIPS-plus' levels. The author approaches the wisdom of including IPRs in FTAs with extreme wariness.

14 Stiglitz Joseph, *Intellectual Property Rights and Wrongs* (August 2005), http://incommunicado.info/node/194 (20 August 2006) Stiglitz Joseph, *Globalization and its discontents* (2003).

15 'Section 301' of the US Trade Act of 1974 (19 USC Sections 2411-2420) and 'Special 301' of the US Omnibus Competitiveness Act of 1988 (19 USC Section 2232) set forth the mechanisms for the United States Trade Representative to 'enforce' US trade laws against countries which do not provide adequate and effective enforcement of IPRs, http://www.ustr.gov/Trade_Agreements/Monitoring_Enforcement/US_Trade_Law_Enforcement/Section_Index.html (21 October 2006).

16 Strategy for the enforcement of intellectual property rights in third countries (2005/C 129/03), *Official Journal of the European Union,* C/129/3 (26 May 2005).

17 India – Patent Protection for Pharmaceutical and Agricultural Chemical Products, WT/DS50/AB/R (WTO Appellate Body, 19 December 1997).

18 Hennessey Bill, Changing traffic patterns in technospace, *Michigan State Law Review,* (1) (2005), 201-218.

19 'The visit by US Commodore Perry to Japan [in 1853, during the administration of US President Franklin Pierce] demonstrated to Japanese leaders the power of modern military innovations and forced Japan to reopen the country to foreigners. The Meiji Restoration and its broad program of industrial modernization and 'catch-up' led to Japan's first patent law in 1871.' Granstand, at 272, asserts that the first three decades after its defeat in World War II, Japan's wholesale adoption of Western technology and lax domestic enforcement of IPRs helped it in the 'catch up' game precipitating the reaction of the United States in the 1970s discussed above.

20 Fagerberg Jan and Godinho M Manuel, *Innovation and Catching-Up*, in Fagerberg *et al* (eds) *The Oxford Handbook of Innovation,* 2006, pp 514-542, at 525.

21 Hennessey Bill, Changing traffic patterns in technospace, *Michigan State Law Review,* (1) (2005), 217-218.

22 'During the eighteenth century English authors suffered from the activities of Irish pirates who could flood both the English and other markets with cheap reprints.' Ricketson Sam, *The Berne Convention for the Protection of Literary and Artistic Works: 1886-1986* 1987, 3, 18-19; Yu K Peter, From Pirates to Partners: Protecting Intellectual Property in China in the Twenty-First century, *American University Law Review,* (50) (2000) 131-241.

23 Fagerberg *et al*, *Innovation: A Guide to the Literature* in Fagerberg *et al* (eds) *The Oxford Handbook of Innovation,* 2006, pp 1-27, at 21.

24 Fagerberg *et al* (eds) *The Oxford Handbook of Innovation* (2006) pp 266-290, at p. 3, notes that cross-disciplinary classrooms tend to be found outside the most prestigious universities, at schools which 'arguably showed a greater receptivity to new social needs, initiatives, and ideas than the more inert, well-established academic 'leaders' or at other types of institutions such as business or engineering schools'.

25 Cantwell John, *Innovation and Competitiveness* in Fagerberg *et al* (eds) *The Oxford Handbook of Innovation*, 2006, pp 543-567, 553.

26 (5 Stat 117) The first United States Patent Law of 1790 required substantive examination by the Secretary of State (at that time, Thomas Jefferson, himself a noted inventor.) The Patent Act of 1793 adopted a system of registration of patents with only formal patent examination. Granstrand Ove, *Innovation and Intellectual Property Rights.* Fagerberg *et al* (eds) *The Oxford Handbook of Innovation* (2006) pp 266-290, 269. To this day, learning to become a patent examiner in the USPTO is primarily through self-education under the tutelage of a Supervisory Patent Examiner (SPE).

27 The George Washington University's National Law Center developed its great strength in IP education in no small part because of the number of USPTO patent examiners who attended its night program. According to a senior official of the USPTO, in 2006 the number of USPTO patent examiners who have law degrees has dropped to less than 10 percent. (private communication) Turnover among patent examiners who leave for lucrative careers as patent attorneys is a major personnel problem for the USPTO. According to the General Accounting Office Report, 'Current workforce models suggest that professional organizations such as USPTO make appropriate investments in education, training, and other developmental opportunities to help build the competencies of its employees. Reviewing patent applications involves knowledge and understanding of highly technical subjects, but USPTO does not require ongoing training on these subjects. Instead, USPTO only requires newly hired examiners to take extensive training on how to be a patent examiner during the first year, and all other required training is focused on legal training. For example, newly hired examiners are required, within their first 10 months at the agency, to take about 200 hours of training on such topics as procedures for examining patent applications, electronic tools used in the examination process, and patent law and evidence. In addition, almost all patent examiners are required to take a range of ongoing training on legal matters, including patent law.' 'USPTO Has Made Progress in Hiring Examiners, but Challenges to Retention Remain', US General Accounting Office, GAO 05-720 (November 2005) http://www.gao.gov/new.items/d05720.pdf#search=%22uspto%20attrition%22 (1 September 2006) p. 30.

28 Interestingly, prior to the first Trademark Act of 1870, it was the practice of patent solicitors to 'register' their client's trademarks with the Patent Office. Such registration had no formal legal significance other than providing notice to others in the marketplace of their claim to common law marks. A stint as a trademark examiner in the USPTO is a familiar career stepping-stone to a lucrative career as a US trademark lawyer. Even after the first Trademark Act was ruled unconstitutional in 1879, patent solicitors continued the informal practice of 'registering' common law marks in the Patent Office (now called the USPTO). It is the author's personal observation that the core of competent patent attorneys (zhuanli daili) which has been established in mainland China is primarily based on human capital trained to be patent examiners in the Chinese Patent Office (SIPO) since it was founded in 1985.

29 'The 1870s was the time that the university in America was beginning to flourish, the intellectual community was infatuated with the 'new sciences' which were driving industrial development, and technical training became the badge of contemporary achievement. It was in such circumstances that Dean Langdell introduced the 'case method' and began the promotion of legal education as the study of a 'science,' with the 'case method' providing the laboratory in which legal doctrines and principles could be explored and developed out of the opinions of appellate courts.' MacCrate Robert, *Legal Education and Professional Development - An Educational Continuum* (MacCrate Report) American Bar Association [ABA] 1992, p. 98 http://www.abanet.org/legaled/publications/onlinepubs/maccrate.html (21 October 2006).

30 Harvard Law School has just announced a radical transformation of its basic law curriculum - the first such transformation in over a century, http://www.thecrimson.com/article.aspx?ref=514774 (6 October 2006).

31 In 1973, the Patent, Trademark, and Copyright [PTC] Foundation was founded at The George Washington University in Washington, DC in 1957. Coclough O S, *The Patent, Trade-Mark, and Copyright Foundation, The PTC*

Journal of Research and Education, June 1957 1, 1-19. The PTC Foundation and The PTC *Journal* of Research and Education moved to Franklin Pierce Law Center in 1973. The *Journal* was renamed *IDEA: The Journal of Law and Technology* that year, and since then has been published continuously at Franklin Pierce.

32 The first foreign patent student at Pierce Law (in 1980) was a patent examiner from Taiwan. A formal doctrinal course in patent law was not added to the Pierce Law curriculum until 1991.

33 In its 2007 term, the US Supreme Court will reconsider the scope of the obviousness standard used in US patent law. Amicus Brief of Franklin Pierce Law Center in Support of Respondents, in the US Supreme Court case of *KSR International Co* v *Teleflex Inc*, http://www.piercelaw.edu/IPAmCl/TFXPrint.pdf.

34 The practice of law in the United States was virtually unregulated in the 19th century. Harvard Law School had only two faculty members in the mid-1800s. (One was Joseph Story, who was also a member of the US Supreme Court.) By the end of Langdell's deanship there in 1895, Harvard still had only eight faculty members for 400 students. New Hampshire was the first state in the United States to establish a 'bar association' for lawyers, in 1873. In 1992, the American Bar Association [ABA], which has been the accrediting body for US law schools since the early 1920s, issued a report entitled 'Legal Education and Professional Development - An Educational Continuum,' (MacCrate Report) admonishing the American legal academy for its growing ineffectiveness in imparting the practical skills and values that new lawyers need. For a revisionist history of the role of the 'Langdell Experiment' in American legal history and the tensions between teaching law students to think analytically through the 'case method' and teaching them the skills they need to practice law, see generally LaPiana, William P, *Logic and Experience : The Origin of Modern American Legal Education* (Oxford, 1994)

35 The design of courses in technology licensing and intellectual property management at Pierce Law was and is the work of Professor Jorda F Karl, Director of the Germeshausen Center for the Law of Innovation and Entrepreneurship and his predecessor, Professor (Emeritus) Blair O Homer.

36 Franklin Pierce Law Center is the only American law school with a student chapter of the Licensing Executives Society (LES-US/Canada), www.lesi.org.

37 For example, if the license is a patent license, a student who does not understand the definition and scope of a patent claim cannot possibly understand what the license covers and does not cover.

38 This question sometimes arises in connection with proposals that if a corporation expends substantial funds to develop and successfully market a product based upon 'traditional knowledge'(TK), it should pay a substantial share of the profits to the original 'holders' of the TK. Looking at the question from a pure risk-reward standpoint, should the TK holder for whom a corporation develops and markets an unsuccessful product be held liable for any share of the losses? Of course, it could be argued that the same question may arise in the case of a patent holder who succeeds in securing a 'no strings attached' upfront royalty payment for an invention and has made his money, but commercialization is a failure which has to be absorbed by the corporate licensee commercializing the invention. How is that situation any different from the up-front TK payment situation?

39 The United States refuses to become a member of the Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations of 1961, primarily because rights in performances in Hollywood movies and in musical production are all arranged through private contracts and labor agreements – not through public law instruments. Other considerations in these industries include the phenomena of 'network effects', interoperability, and technology standardization, which may determine the private ordering of contracts between the parties and may also present significant and unique challenges to intellectual property policy-makers not found in other industries.

40 In this regard, the work of the Association of University Technology Managers [AUTM] is significant, www.autm.org.

41 The World Trade Organization has just upgraded its website on TRIPS and Public Health, http://www.wto.org/english/tratop_e/trips_e/pharmpatent_e.htm (20 October 2006).

42 The phrase 'dialogue of the deaf' has been coined by Justice Anthony Kennedy to describe the current hostile relationship between American and Islamic cultures, http:// sfgate.com/cgi-bin/article.cgi?file=/c/a/2006/10/19/MNGT4 LRSIE1.DTL.

43 The 'General Exception' of Article XX(d) of the GATT (1994) regarding the role of IPR protection in the world trading system colors every aspect of the interpretation the TRIPS Agreement. It states:

> '…Nothing in this Agreement shall prevent the adoption and enforcement of measures necessary to secure compliance with laws or regulations which are not inconsistent with the provisions of this Agreement, including those for … the protection of patents, trade marks and copyrights, and the prevention of deceptive practices….' Beyond the 'minimum standards' required of all WTO member states by the TRIPS Agreement as they continue to evolve through the work of the TRIPS Council, the existence and scope of IPRs remain, as they should, fundamentally questions of domestic law.