

Graduate Students' Ownership and Attribution Rights in Intellectual Property[†]

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INTRODUCTION

University intellectual property policies have become standard form policies varying only slightly in substance from one university to another. At their core, these policies provide guidelines that govern intellectual property ownership issues that may arise in the context of university research. The policies seek to harmonize these issues with the university mission to generate and disseminate information for the benefit of the university and society as a whole. Faculty employment contracts often refer to these policies, noting that they are part of the contractual agreement between the university and the professor. In this context, the policies serve as preinvention assignment agreements where faculty agree to assign rights in inventions and creations conceived and reduced to practice during the course of their employment in exchange for continued employment and a share in the royalties. Universities' comprehensive guidelines regarding faculty-generated inventions can be interpreted as a reflection of the increasing role faculty play in devising equitable policies. Unfortunately, these same policies fail to provide equally comprehensive guidelines regarding graduate students' ownership interests in student-generated inventions.

While a university claim of ownership in faculty-generated inventions might have a legal foundation rooted in traditional employer-employee relationships, the legal foundation to a university claim in student-generated inventions is much weaker. The university-student relationship is not analogous to an employer-employee relationship. As a result, universities lack the legal authority to exert ownership interests in the student-generated creation under patent law's hired-to-invent doctrine, copyright law's work-for-hire doctrine, or contractual assignment agreements.

This Note examines the protection faculty receive for their creations and intellectual contributions. This Note suggests that under current laws governing patent and copyright ownership intellectual property in student-generated creations belongs to the student, notwithstanding the fact that such creations are due in part to university resources. Part I provides a brief overview of the prominent role universities, their faculties, and their students play in conducting research. Part II presents a framework for examining the intellectual property ownership issues faced at the university level, by providing basic information concerning patent law, copyright law, and traditional employer-employee relationships regarding intellectual property. Part III discusses contractual assignment agreements, the hired-to-invent and the work-for-hire doctrines, and fundamental contract doctrines in the context of a university-faculty relationship. Part IV examines these same concepts and argues that they form the legal basis for granting graduate students the ownership and attribution they deserve. Part V explores some of the nonlegal reasons to recognize student ownership in intellectual property and some of the consequences of doing so.

A university may view a proposal to reallocate ownership interests, particularly in intellectual property that it has enjoyed for years, as a threat to its financial well-being. However, this Note suggests that recognizing graduate students' contributions to scientific advances serves to perpetuate university missions and, at the same time, bestows upon students a more gratifying sense of achievement. Such gratification can

carry over into their professional careers and instill in students a more favorable impression of their school. The impression students develop will benefit their universities because of the students' potential influence in distributing research grants.¹

I. GRADUATE STUDENTS, FACULTY, AND RESEARCH AT UNIVERSITIES

Students labor through organic and physical chemistry, differential equations, and quantum mechanics to earn a bachelor's degree in engineering. They enter graduate school in an effort to develop a better understanding of their discipline, and opt to forgo the enticing arena of the professional job market where engineers consistently command the highest starting salaries among all undergraduate majors.² Industry demands talented students who will bring with them analytical and inventive skills that will prove a valuable investment for the company. The fulfillment of demanding entrance requirements and the highly selective nature of today's graduate programs indicate that universities are competing with industry for the best graduates. Universities not only compete for these same students, but have historically attracted the best of each year's class.³

Most graduate departments—for instance, chemical engineering departments⁴—offer two graduate degree programs: master's and doctorate. These programs often require students to enroll in a number of courses in addition to fulfilling the responsibilities of a teaching assistant for undergraduate courses. As part of their graduate education, students receive intensive research experience in an effort to expose them to areas which will further motivate them toward their own original research. Original research plays a major role in both degree certification programs. Upon consultation with faculty, students choose their thesis topics freely and with great expectations.

Through completion of rigorous graduate programs, students expect at least to develop the research and analytical skills characteristic of the faculty within their departments. Students also remotely expect that their research will lead to breakthrough advances. Working on and completing these develops research and analytical skills, critical judgment, the resourcefulness required to deal with difficult research problems, the personal responsibility for the solution of a novel problem, and the independence that

1. A study by the National Science Board indicates:

[D]octoral graduates who are employed in industry may serve as key links in initiating cooperative research efforts with their former university. The familiarity of these graduates with the capabilities and interests of their former professors and with the needs of their employers makes them highly desirable as initiators of university/industry research collaboration. It is not uncommon for a former graduate student to call his major professor and propose a joint research effort.

NATIONAL SCIENCE BOARD, UNIVERSITY-INDUSTRY RESEARCH RELATIONSHIPS 94 (1982).

2. See, e.g., Dan Moreau, *Good Jobs for Fresh Grads*, KIPLINGER'S PERS. FIN. MAG., Mar. 1995, at 110, 112.

3. See William J. Cook & Gary Cohen, *Made in America Comes Back: Manufacturing Is the New Hot Button at Leading Engineering Schools*, U.S. NEWS & WORLD REP., Mar. 23, 1992, at 81, 84.

4. The Author's frequent references to chemical engineering programs do not imply that the issues and problems discussed in this Note are limited to those programs. Indeed, they are equally germane to all of the engineering and natural science fields of study.

enables the students to extract their creative thoughts.⁵ Participation in a rigorous research program provides a link between students and professionals, and introduces to society tomorrow's most promising scientists, engineers, and medical doctors.

Today, our nation's universities provide essential and cutting-edge technological innovation that once could be found only in industry or government laboratories.⁶ The growth of the university as the birthplace of many inventive discoveries over the past two decades has brought recognition, prestige, and money to these schools. Universities consequently approach today's advances with the hope of educational and monetary achievement inconceivable twenty-five years ago.⁷ One need look no further than the comprehensive university intellectual property guidelines to see that administrators recognize the prizes that are now customary with major advances. The growing university

5. Wolfgang K. H. Panofsky, *Big Science and Graduate Education*, in SCIENCE POLICY AND THE UNIVERSITY 189, 193 (Harold Orlans ed., 1968). The student's participation in research provides him or her with another source for learning "the techniques that exist only in research involving genuinely new questions and [how] to make judgments in the choice of research problems, tools, and methods." *Id.*

6. "The combined federal basic and applied research investment reached an estimated \$28 billion in fiscal year 1993. A large fraction of it—37 percent, including one-half of the basic research total and one-fourth of the applied research total—was carried out in the Nation's universities and colleges." NATIONAL SCIENCE BOARD, SCIENCE & ENGINEERING INDICATORS 107 (1993).

7. Monsanto has given almost \$100 million to Washington University for biological research and first refusal rights on patentable inventions arising from the work it funds. Tim Beardsley, *Trends in Biological Research: Big Time Biology*, SCI. AM., Nov. 1994, at 90, 92A. As of February, 1990, Monsanto's generous support had funded over 50 research projects and had yielded over 40 patents or patent-pending discoveries. Naomi Freundlich, *Why Monsanto Keeps Going Back To School*, BUS. WK., Feb. 5, 1990, at 63. Monsanto also has given Harvard Medical School \$23 million, in addition to a sizable donation to the Harvard endowment, to support the work of medical scientists involved in fundamental cell research related to understanding the development of tumors. NATIONAL SCIENCE BOARD, *supra* note 1, at 43. In 1980, the Exxon Corporation began providing the Massachusetts Institute of Technology with \$8 million to support basic research in combustion processes related to the burning of coal, coal liquids, shale oil, and heavy crude oil. *Id.* at 43-44.

The fruits of research endeavors independent of industry or government funds also boast hefty economic figures. For instance, the popular drink "Gatorade" has brought the University of Florida over \$21 million since 1973, when faculty researchers invented and tested the drink's ability to replenish nutrients lost through perspiration. Jack Wheat, *In the Lab: "The Next Gatorade" Means to University Researchers What the National Championship Does to Many Sports Fans*, MIAMI HERALD, Jan. 24, 1993, at 6B. According to Dr. Frederic Erbsich, the director of Michigan State University's Office of Intellectual Property, the university has received over \$13 million annually since 1993 from patent licensing and royalties of the world's leading anti-cancer drugs, Cisplatin and Carboplatin, which were invented by the university's researchers. Tom Henderson, *The State of Technology Transfer*, CORP. DETROIT MAG., July 1995, at 54. Since 1980, the University of California-San Francisco and Stanford University have received over \$100 million in royalties and licensing revenue from a biological process developed by the universities' faculty members. See *infra* note 45. According to the Association of University Technology Managers, Inc., in 1993 alone, University of California, Stanford University, Columbia University, University of Wisconsin-Madison, and University of Washington received over \$128 million in royalties from licensing agreements. *Executive Summary and Selected Data Fiscal Years 1993, 1992, and 1991*, AUTM LICENSING SURV., Oct. 1994, at 8. Often the revenue from university-generated patents goes unnoticed since the inventors, along with university technology transfer personnel, create businesses to market the invention. The Massachusetts Institute of Technology, perhaps the most successful of all universities in this area, has "spun off 836 businesses with sales of \$60 billion." Howard Goodman, *University Research: Whose Work Is It, Anyway?*, PHILA. INQUIRER, Sept. 12, 1993, at A1.

practice of producing and selling technological advances is a benefit to university budgets,⁸ yet does not come without special problems.⁹

In recent years, faculty members have organized their own committees to voice opinions on the allocation of ownership rights in faculty-generated creations. Through their participation in the drafting and revision processes of university intellectual property policies, these committees are responsible for the new effort, reflected in the policies, to protect faculty interests in their creations.¹⁰ These same policies, however, fail to recognize the student's interest in his or her creation. It is no secret that the fruits of academic research would not be as abundant, and in some cases would not even exist, were it not for the invaluable time, effort, and intellectual contribution graduate students make.

Although an undergraduate degree in the natural sciences or engineering has been considered the prerequisite for many types of inventive employment, the graduate degree is preferable. While the receipt of the advanced degree is coveted by the graduate student, the pursuit of the degree is invaluable to society in general. The benefits to society of the work such students contribute accrue immediately and are in no way insignificant. For example, human insulin, interferon, and the hepatitis B vaccine all evolved in part from university-based research.¹¹ Biotechnology companies, as licensees, "have brought about 30 new medical products to market—a boon to humanity as well as to the scientists who developed them."¹² In the case of biological products intended for human use, the Food and Drug Administration's stringent requirements demand meticulous testing and analysis, frequently performed by graduate students. Such testing and analysis invariably leads to numerous modifications, the result of the ingenious input of all involved.

8. "In constant dollars, academic [research and development] financed by industry increased an estimated 265 percent from 1980 to 1993." NATIONAL SCIENCE BOARD, *supra* note 6, at xxii. Faculty surveyed at the Massachusetts Institute of Technology, Stanford University, Pennsylvania State University, and University of California-Berkeley indicate an "increased interest by industry in funding research and an increased willingness and capacity of universities to accept such funding, which, by its nature, leads to more applied research." GARY W. MATKIN, *TECHNOLOGY TRANSFER AND THE UNIVERSITY* 292 (1990).

9. Universities are in the business of educating students and producing information. The pursuit to commercialize this knowledge is a fundamental strategy change and may interfere with educational goals at the expense of students. Former Harvard University president Derek C. Bok believes that the prospect of technology transfer arouse[s] anxiety on the campus of almost every distinguished research university . . . [and this concern stems] from an uneasy sense that programs to exploit technological development are likely to confuse the university's central commitment to the pursuit of knowledge and learning by introducing into the very heart of academic enterprise a new and powerful motive—the search for commercial utility and financial gain.

Derek C. Bok, *Business and the Academy*, HARV. MAG., May-June 1981, at 23, 26; see also Richard E. Anderson, *The Advantages and Risks of Entrepreneurship*, ACADEME, Sept.-Oct. 1990, at 9, 11 (arguing that universities' pursuit of additional commercial resources creates new risks and alters the university environment).

10. One commentator notes, however, that "many policies contain internal inconsistencies, undefined terms, and unnecessarily vague language." Laura G. Lape, *Ownership of Copyrightable Works of University Professors: The Interplay Between the Copyright Act and University Copyright Policies*, 37 VILL. L. REV. 223, 256 (1992). However, university copyright policies show some concern for faculty's interest in their creative works, albeit in the form of purely symbolic assertions of commitment to academic freedom, royalty provisions, and through express disclaimers by the university of copyright in certain works of authorship. *Id.* at 261. Another commentator notes that "[p]olicies drafted by universities range all over the map . . . Patent policies . . . often require inventors to hand over ownership and a share of the revenues to the university." D'Vera Cohn, *Professors Invent Collegiate Quandary*, WASH. POST, Oct. 22, 1986, at A1, A15.

11. Beardsley, *supra* note 7, at 92A.

12. *Id.*

Seen as a fresh source for information and new techniques, universities are beginning to compete with industry in the pursuit of patents.¹³ Industry views this challenge in different ways. Some company representatives regard universities' interest in obtaining patents as a threat to their own interests and are reluctant to enter into cooperative research agreements with universities actively pursuing patents.¹⁴ To the extent that a company joins a university in a research relationship, it views the university as a valuable asset and graduate students as potential employees. In a study conducted by the National Science Board, seventy-five percent of industry representatives interviewed cited access to high-quality manpower as "a motivating factor in their support of university research."¹⁵ This is an indication that industry recognizes the value of the research graduate students are capable of providing. Students typically realize how valuable they are by their success in securing permanent research positions upon graduation. The university realizes their value in the form of lucrative royalty and licensing schemes.¹⁶ For universities, intellectual property in the form of patents provides more than just royalty income. Patents act as a means of strengthening important relationships with industry and as a source of vital income to support further research.¹⁷

Universities' interest in intellectual property contributes to the longer time commitments often required by today's graduate degree programs. In chemical engineering, for example, Ph.D. programs formerly completed in four years may now require longer commitments.¹⁸ It is doubtful that the advances in the field of chemical engineering warrant the additional commitments. These commitments are increasingly

13. Nearly one-fourth of all patents issued to United States academic institutions since 1969 were awarded in 1990-91. NATIONAL SCIENCE BOARD, *supra* note 6, at xxii, 152. This rapid growth "was especially true in the health and biomedical-related areas and is one indicator of the potential role played by academic [research and development] in the development of technology and new products. It may also be an indication of increased interest by university researchers in the marketplace." *Id.* at xxii-xxiii.

14. NATIONAL SCIENCE BOARD, *supra* note 1, at 105.

15. *Id.* at 34 (finding that most company representatives cited the access to high-quality manpower as "the single most important motivator" underlying their desire to establish joint university/industry research programs).

16. See *supra* note 7.

17. As government funding for university research projects slowly erodes, universities are frantically seeking and cheerfully welcoming industry grants. See Derek C. Bok, *What's Wrong With Our Universities?*, 14 HARV. J.L. & PUB. POL'Y 305, 316 n.34 (1991) (stating that "universities with successful [graduate] faculties receive substantial amounts of money to help defray their overhead expenses while institutions that lack such faculties do not").

18. NORTHWESTERN UNIVERSITY, GRADUATE STUDY IN CHEMICAL ENGINEERING 15 (1991) (stating that satisfactory completion of the Ph.D. program usually requires 4½ to 4¾ years); TEXAS A&M UNIVERSITY, GRADUATE CHEMICAL ENGINEERING 2 (1991) (noting that completion of Ph.D. program may take up to five years); UNIVERSITY OF NOTRE DAME, CHEMICAL ENGINEERING 23 (1992) (noting that in recent years, those students who entered the program with an undergraduate degree in chemical engineering "have completed the Ph.D. degree requirements in approximately 4 years"); UNIVERSITY OF WISCONSIN, A TRADITION OF EXCELLENCE IN CHEMICAL ENGINEERING (1992) (pamphlet) (noting that "most students complete the Ph.D. requirements in 4 to 5½ years"); YALE UNIVERSITY, ENGINEERING AND APPLIED SCIENCE AT YALE UNIVERSITY: GRADUATE PROGRAM 1992-1993 41 (1992) (stating that "the upper limit for completing doctoral work is six years").

Many universities do not set approximate time lengths for their programs. Instead, they leave open the time commitment and focus on the students' satisfactory completion of significant research theses along with a specified number of course credits. See, e.g., DARTMOUTH COLLEGE, THAYER SCHOOL OF ENGINEERING: GRADUATE DEGREE PROGRAMS 14 (1992); LEHIGH UNIVERSITY, GRADUATE STUDY AND RESEARCH IN CHEMICAL ENGINEERING 4 (1992); THE OHIO STATE UNIVERSITY, GRADUATE SCHOOL BULLETIN 40-41, 58-59 (1992); RICE UNIVERSITY, GRADUATE STUDY IN CHEMICAL ENGINEERING 2-3 (1992); UNIVERSITY OF MASSACHUSETTS AT AMHERST, GRADUATE PROGRAM IN CHEMICAL ENGINEERING 2-3 (1992); UNIVERSITY OF PITTSBURGH, GRADUATE STUDY: CHEMICAL AND PETROLEUM ENGINEERING 10 (1992); THE UNIVERSITY OF TEXAS AT AUSTIN, GRADUATE STUDIES IN THE DEPARTMENT OF CHEMICAL ENGINEERING 15 (1991).

seen as examples of universities' unfair bargaining position and their abuse of their resources in retaining students as "cheap labor" in its pursuit of research grant income.

The conclusion to be reached from the foregoing discussion is that because universities play a much more significant role in research, the demands on their faculty and graduate students are also more significant. Moreover, while this nation and its industries begin to rely more heavily on universities to produce research, they, along with the universities, will place a heavier burden on the faculty and graduate students. While faculty are beginning to realize the fruits of their labors in the form of ownership interests in patents and copyrights, students are not.

II. INTELLECTUAL PROPERTY: A FEW OF THE BASICS

The Constitution states that "The Congress shall have Power . . . To Promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries . . ." ¹⁹ Intellectual property laws, namely patent and copyright, were established to promote the progress of science and useful arts. First, these laws provide an incentive to create by offering the possibility of reward through limited monopoly rights.²⁰ This potential reward encourages the investment of time, effort, and capital in research and development ventures. Second, the laws invite the investment of additional capital needed for further development and marketing of an invention.²¹ In return, the creator receives limited monopoly rights in the creation. Finally, through the protection afforded the inventor, the laws encourage public disclosure of technological information which might otherwise be held in secrecy.²² Such disclosures reduce the likelihood of duplicative efforts by others and provide a foundation for further advances in the technology involved.

Intellectual property differs markedly from tangible property. Unlike real or personal property, the use of intellectual property is not inherently exclusive. Without a system of assigning legal title to intellectual property and restrictions on its use, all who are privy to its disclosure can use it, whether or not they contributed to its creation. Because this Note discusses the impact of both copyright law (which protects expression) and patent law (which protects technological products) at the university level, a brief introduction to patent and copyright law will aid in understanding intellectual property ownership rights. Both branches of law are governed by Congress, administered by federal agencies, and related disputes are heard by federal courts.

Each form of protection strikes a different balance between providing an incentive to create and distributing valuable information to pursue more scientific and artistic advances. In order to qualify for copyright protection, the work must exhibit a minimal amount of originality.²³ Such protection exists in the expression only and does not extend

19. U.S. CONST. art. I, § 8, cls. 1, 8.

20. See 1 WILLIAM C. ROBINSON, *THE LAW OF PATENTS FOR USEFUL INVENTIONS* § 33 (Boston, Little, Brown, and Co. 1890).

21. *Id.*

22. *Id.*

23. 17 U.S.C. § 102(a) (1994).

to the underlying ideas, concepts, or processes.²⁴ Moreover, copyright does not protect against independent creation of an already copyrightable work.²⁵ A work must contain a much higher level of novelty in order to be entitled to patent protection.²⁶ The creator of such a work receives limited monopoly rights in the invention, and enjoys the right to prohibit others from asserting independent authorship.²⁷ Throughout the analysis, it is important to remember that a student is no less capable of receiving protection under either law than anyone else.

A. Patent Law

The Patent Act of 1952 gives inventors²⁸ the right to exclude others from making, selling or offering for sale, or using their inventions for a specified length of time²⁹ in exchange for full disclosure of their patented inventions.³⁰ This bargain serves to promote the progress of science and useful arts specified in the Constitution. An inventor's exclusive rights begin upon the grant of a patent by the United States Patent and Trademark Office. Patents are granted to any individual applicant, including a student, faculty member, or administrator, who "invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof."³¹

A patent application is a document typically drafted by a patent attorney and submitted to a patent examiner in the United States Patent and Trademark Office. A patent attorney is admitted to practice before the Patent Office and has developed an expertise in an area of technology based on formal education, practical experience, or both, which enables him or her to work with inventors to draft an application. The patent examiner evaluates the application to ensure that the invention meets the requirements for patentability set forth in title 35 of the United States Code. The examiner only denies an application for a patent if the examiner can establish a prima facie case that the invention is either not novel,³² lacks utility,³³ or is obvious to a person of ordinary skill in the art.³⁴

24. *Id.* § 102(b).

25. *Id.* § 106 (1994).

26. 35 U.S.C. §§ 101-103 (1988).

27. *Id.* § 271 (1988 & Supp. V 1993), amended by Pub. L. No. 103-465, 108 Stat. 4809, 4988 (1994).

28. An inventor is one who makes "some contribution to the inventive thought and to the final result" of an invention. *Monsanto Co. v. Kamp*, 269 F. Supp. 818, 824 (D.D.C. 1967). One who merely suggests an idea without the means of reducing the idea to practice is not an inventor. *Regents of the Univ. of Cal. v. Synbiotics Corp.*, 849 F. Supp. 740, 742 (S.D. Cal. 1994).

29. The term of a United States patent begins on the date it issues and ends 20 years from the date on which the application for patent was filed in the United States. 35 U.S.C. § 154 (1988), amended by Pub. L. No. 103-465, 108 Stat. 4809, 4983-85 (1994).

30. Some describe the process of innovation as "the search for, and the discovery, development, improvement and adoption of new processes, new products, and new organizational structures and procedures." Thomas M. Jorde & David J. Teece, *Innovation, Cooperation and Antitrust*, 4 HIGH TECH. L.J. 1, 5 (1989). Invention, on the other hand, can be defined as that part of innovation that represents the "discovery" aspect. Steven Cherenksy, *A Penny for Their Thoughts: Employee-Inventors, Preinvention Assignment Agreements, Property, and Personhood*, 81 CAL. L. REV. 597, 609 (1993).

31. 35 U.S.C. § 101 (1988).

32. *Id.* §§ 101-102.

33. *Id.* § 102.

34. *Id.* § 103.

The first requirement in obtaining a patent is that the invention must be novel. One may not patent that which is known or used by others in the United States or already patented or described in a printed publication.³⁵ This requirement, of course, is consistent with the overall bargain nature—exclusive rights in exchange for disclosure—of patent law. If the invention is already known or used by others in the United States, already patented, or described in a printed publication, there is nothing left for the inventor to disclose. Therefore, no justification exists for providing the individual with exclusive rights. Thus, a failure to establish novelty, in and of itself, is a ground for denying patent protection. Similarly, failure to file for a patent application within one year of an invention's disclosure in a printed publication or its offer for sale in this country also acts as a bar to patent obtainment.³⁶ Absent patent protection, the novelty of the subject matter disappears with the passage of time. Therefore, the disclosure of the subject matter in a printed publication or its offer for sale more than one year prior to the filing of the patent application transforms what was once novel into what is now common. This time constraint promotes the prompt disclosure of the invention to the public, discourages the concealment of useful information in the form of trade secrets, and reduces the likelihood of duplicative efforts.

The second requirement in obtaining a patent is that of utility. The Constitution does not encourage the progress of *useless* arts. Therefore, the invention must exhibit some identifiable benefit to humans.³⁷ Most inventions do not suffer from a lack of utility; therefore, most inventions do not have any difficulty satisfying this requirement. Moreover, because of the costs associated with obtaining a patent, it makes no sense for one to seek a patent for material that is of no use and will not generate revenue. Often many years pass before a patent issues, and the administrative procedures (and the legal fees required to navigate them) cost thousands of dollars.³⁸ A patent should be sought after examining the invention's utility, and then only after also examining the marketability of the invention, the potential profits, and the patent's ability to withstand an attack in the courts.³⁹

The final requirement is nonobviousness. Were an invention deemed obvious, by definition there would be nothing to disclose. Thus, this third requirement, like the previous two, is consistent with the bargain nature of patent law. Notwithstanding the

35. *Id.* § 102(a).

36. *Id.* § 102 (a)-(b).

37. *Brenner v. Manson*, 383 U.S. 519 (1966) (holding that until a pharmaceutical drug's utility to human beings is established, it is of no utility for the purpose of § 101).

38. One seeking to obtain a patent will encounter a minimum wait of one year from the date the application is filed; often the procedure takes two years. Jerome S. Gabig, Jr., *Federal Research Grants: Who Owns the Intellectual Property?*, 9 HARV. J.L. & PUB. POL'Y 639, 645 (1986). The average cost of obtaining a single patent is about \$10,000. Edward L. MacCordy, *The Threat of Proposed Patent Law Changes to the Research University*, 20 J.C. & U.L. 295, 306 (1994). Due to these high costs, small entities are often limited to seeking patent protection for only the most economically promising creations. *Id.*

39. In the context of university-generated research, university technology transfer offices typically conduct the analysis leading to the conclusion of whether or not to seek patent protection. These technology transfer offices, no doubt, are mindful of the fact that "[a]pproximately fifty percent of all patent litigation that proceeds to judgment results in the patent being ruled invalid." Gabig, *supra* note 38, at 645; see also Nicholas L. Coch & Edward J. FitzPatrick, *Due Diligence Required of Exporters to the U.S.*, NAT'L L.J., Oct. 23, 1995, at C21 (noting that current statistics indicate that "patentholders prevail in the Federal Circuit approximately 80 percent of the time, as compared to a 50 percent victory rate in the federal district courts").

simplicity of this requirement in the context of the bargain nature of patent law, it is perhaps patent law's most complex concept, due to the difficulty in determining which inventions are and are not obvious.

The United States Supreme Court, in *Graham v. John Deere Co.*,⁴⁰ set forth a three-step factual inquiry for determining what is and is not obvious. Establishing the scope and content of prior art and establishing the differences between such prior art and a claimed invention are the first two steps. The third step is determining what level of skill is considered "ordinary" by practitioners in the art. Prior art is the subject matter pre-dating the invention. Prior art may or may not have been used in the inventive process. For example, an artist's easel used for holding a painting may not be considered prior art for an invention of a car-top luggage carrier.⁴¹ Although both carry or hold objects, an artist's easel is not reasonably pertinent to the problem of transporting luggage atop a car. A pump, however, may be considered prior art for a claimed invention regarding a compressor since a pump is a type of compressor.⁴²

The difficulties in determining the level of ordinary skill of practitioners in the art are similar to those found in establishing the characteristics of tort law's "reasonable person." Among some of the determining factors which courts consider are the educational level of active workers in the field, sophistication of the technology, the rapidity with which innovations are made, and prior attempts to solve the problem which the invention at issue solves.⁴³ The actual inventor's level of skill is not relevant, however.⁴⁴ In sum, the patent examiner will deny the application for a patent if he or she finds that the claimed invention would have been obvious to a hypothetical person of ordinary skill in the art in light of the prior art.

A patent will be granted to any individual who satisfies the requirements discussed above. Traditionally, patents were granted primarily for mechanical, electrical, and chemical processes, products, and machines. Today's patents are also often granted for biological creations⁴⁵ and computer-based mathematical algorithms.⁴⁶ Whether an individual recognizes the patentability of his or her creation is an issue outside the scope of this Note. The key point one must remember is that *all* individuals possess the traits

40. 383 U.S. 1 (1966).

41. See *Bott v. Four Star Corp.*, 218 U.S.P.Q. (BNA) 358 (E.D. Mich. 1983), *aff'd*, 732 F.2d 168 (Fed. Cir. 1984).

42. See *In re Deminski*, 796 F.2d 436 (Fed. Cir. 1983).

43. *Environmental Designs, Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693 (Fed. Cir. 1983), *cert. denied*, 464 U.S. 1043 (1984).

44. *Standard Oil Co. v. American Cyanamid Co.*, 774 F.2d 448, 454 (Fed. Cir. 1985) (stating that the obviousness of the invention is judged against a hypothetical person possessing ordinary skill in the art).

45. *Diamond v. Chakrabarty*, 447 U.S. 303 (1980) (holding that the use of bacteria to decompose oil was patentable subject matter because the bacteria were not the product of nature but of human ingenuity and that no patent statute explicitly excluded living organisms from the scope of patent protection). Soon after the *Chakrabarty* decision, Professor Herbert Boyer of the University of California-San Francisco and Professor Stanley Cohen of Stanford University received a patent for their method of transplanting functioning genes from different organisms into bacteria, which could then be grown in large quantities. What previously could be accomplished only through laborious extraction procedures from animal or plant tissue could now be produced at will by using bacteria as the production source. The two biologists assigned their patent rights to their respective universities, which in turn licensed the process in exchange for a fee. The patent has generated over \$100 million since 1980. Beardsley, *supra* note 7, at 92; see also Marjorie Shaffer, *University Patents: When Research Labs Go After Business*, N.Y. TIMES, Feb. 23, 1992, § 3, at 10.

46. *Diamond v. Diehr*, 450 U.S. 175 (1981) (upholding two patent claims: one for a method of operating a rubber-molding press with the aid of a digital computer, and another for a method of continuous recalculation that could not be performed without a computer).

needed to produce patentable material. Each person's imagination is the source that generates new and useful things, while the inventive nature of human beings provides the essential resource for conceiving something previously unknown. The patent system merely gives people the incentive to use these faculties for the benefit of society.

B. Copyright Law

Congress defined copyright as "the right of an author to control the reproduction of his intellectual creation."⁴⁷ Unlike patent protection, which begins upon a grant by the federal government, copyright protection begins automatically upon creation of "original works of authorship fixed in any tangible medium of expression."⁴⁸ Copyright protection exists to provide authors with an incentive to create and to promote the cultural well-being of the society at large. Where patent law provides the creator with exclusive rights for up to twenty years in exchange for full disclosure, copyright law provides the author⁴⁹ with a wider array of exclusive rights⁵⁰ for the life of the author plus fifty years⁵¹ in exchange for the deposit of two copies of the work at the Copyright Office.⁵² Copyright law also rewards independent creation, whereas patent law accords protection only to the first inventor and no protection to a subsequent independent inventor.⁵³

A work of authorship is fixed in a tangible medium of expression if it is embodied in a copy or a phonorecord such that the work can be "perceived, reproduced, or otherwise communicated either directly or with the aid of a machine or device" for a nontransitory period of time.⁵⁴ Another requirement for copyright protection is that of "originality" based on independent creation by the author and a minimal amount of creativity.⁵⁵ The subject matter eligible for copyright protection includes literary, pictorial, graphic, sculptural, audio, and visual works, and computer programs.⁵⁶ Protection exists for both published and unpublished works; however, published works must contain a copyright notice on all publicly distributed copies in order to preserve infringement remedies.⁵⁷

47. COPYRIGHT LAW REVISION: REPORT OF THE REGISTER OF COPYRIGHTS ON THE GENERAL REVISION OF THE U.S. COPYRIGHT LAW, 87th Cong., 1st Sess. pt. 1, at 3 (1961).

48. 17 U.S.C. § 102(a).

49. The Copyright Act of 1909 lacked a statutory definition of "author"; however, the United States Supreme Court stated that an author is the person "to whom anything owes its origin." *Burrow-Giles Lithographic Co. v. Saroni*, 111 U.S. 53, 57-58 (1884). Over a century later, the Court, upon noting the absence of a statutory definition of "author" under the Copyright Act of 1976, defined an author as "the party who actually creates the work [by] transl[at]ing an idea into a fixed, tangible expression entitled to copyright protection." *Community for Creative Non-Violence v. Reid*, 490 U.S. 730, 737 (1989).

50. 17 U.S.C. § 106.

51. *Id.* § 302(a) (1994).

52. *Id.* § 407 (1994). Note, however, that the deposit requirement in § 407 is not a condition precedent to protection.

Id. § 407(a). Deposit serves to preserve remedies in an action for infringement.

53. 35 U.S.C. § 102(f).

54. H.R. REP. NO. 1476, 94th Cong., 2d Sess. 553 (1976), *reprinted in* 1976 U.S.C.C.A.N. 5659, 5664-66.

55. 17 U.S.C. § 102(a); *Feist Publications, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340 (1991) (holding that although the amount of creativity necessary to enjoy copyright protection is minimal, alphabetical listing of names in the white pages of a telephone book does not satisfy this minimal threshold of creativity).

56. 17 U.S.C. § 102. There is no copyright protection for any fact, "idea, procedure, process, system, method of operation, concept, principle, or discovery," regardless of the form in which it is expressed. *Id.* § 102(b).

57. *Id.* §§ 401-405 (1994).

In the context of university-generated creations, ownership issues surrounding copyrights are not as significant as ownership issues regarding patents. This is due in part to three reasons, all of which reflect differences in the two forms of law. First, copyright protection exists for creations exhibiting a minimal amount of creativity; hence, it is not difficult to acquire. Patent protection, on the other hand, requires a much higher threshold of novelty in order for the creation to be accorded protection. This in turn requires a much more significant capital investment to develop patentable subject matter. Second, patent protection begins only upon a grant by the United States Patent and Trademark Office. Copyright protection, on the other hand, begins immediately upon the fixation of the expression in a tangible medium. Thus, the costs of acquiring patent protection greatly exceed the costs of establishing copyright protection. Third, patent protection endures for a much shorter period of time than does copyright protection. Moreover, the value of the exclusive rights accompanying the patent typically exceeds the value of the exclusive rights that accompany copyrights. While copyright protection is distinguishable from patent protection, one should note that all individuals, including students, possess the traits needed to create copyrightable material.

C. Traditional Employer-Employee Relationships Regarding Intellectual Property

1. Patent Law's Hired-To-Invent Doctrine and Preinvention Assignment Agreements

Patent law evolved during an era of individual inventors. Invention used to be characterized by the individual efforts of nonprofessional, unspecialized, untrained inventors who worked by themselves through the exercise of their own inventive capacity.⁵⁸ Today the work of independent inventors remains important; nevertheless, most financially significant inventions arise out of organizational environments.⁵⁹ Each year the lion's share of all patents are awarded to employed inventors.⁶⁰ Thus, the issues of who owns the invention and what rights vest in the employer and employee are critical to the patent system's goal of stimulating inventive activity.

An employee owns the patent rights to his or her inventions conceived during the course of employment with two exceptions. First, if an employee was initially hired⁶¹ or later directed⁶² by the employer to solve a specific problem or to exercise his or her

58. Cherenky, *supra* note 30, at 606-07.

59. For short biographical information on inventors who succeeded in an organizational environment, see Constance Holden, *Model Systems*, 252 *SCIENCE* 1122, and on independent inventors, see KENNETH A. BROWN, *INVENTORS AT WORK: INTERVIEWS WITH 16 NOTABLE AMERICAN INVENTORS* 219 (1988).

60. For instance, in 1991, 71% of all patents granted were owned by corporations. NATIONAL SCIENCE BOARD, *supra* note 6, at 172.

61. *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 187 (stating that one hired to invent is bound to assign all patent rights in the invention to the employer), *amended*, 289 U.S. 706 (1933); see also *infra* notes 83-86 and accompanying text.

62. See, e.g., *Houghton v. United States*, 23 F.2d 386, 390 (4th Cir.) (noting that an employee not specifically hired to invent but later assigned the task of inventing can make no claim to ownership due to a "duty which the employee owes to his employer with respect to the service in which he is engaged"), *cert. denied*, 277 U.S. 592 (1928).

inventive skills, then the employee must assign the patent rights to his or her employer. Second, the employer is entitled to the patent rights if the employee signed a contract agreeing to assign the patent rights to the employer.⁶³ This framework forms the starting point from which the law regarding patent ownership in an employer-employee relationship begins.

Absent a preinvention assignment agreement or any evidence that the employee was hired to invent, an employer whose employee uses the employer's resources to conceive,⁶⁴ or reduce to practice, an invention acquires a "shop right." The shop right doctrine equitably splits the patent rights between the inventor and his employer, rather than give one party all the rights.⁶⁵ The shop right gives the employer a nonexclusive, royalty-free, nontransferable license to make, use, and sell the invention.⁶⁶ The doctrine does not provide the employer with an ownership interest since the employee, as the patentee, retains all other rights, including licensing and filing of infringement suits. The shop right continues for the life of the patent even if the employee-inventor leaves the place of employment. An employee who uses any amount of his employer's time, equipment, or facilities to develop an invention impliedly gives the employer shop rights in the invention.⁶⁷

Due to its inalienability, the shop right is significantly less valuable to employers than the full ownership interest in the patent. Therefore, in an effort to ensure ownership rights

63. Since *Standard Parts Co. v. Peck*, 264 U.S. 52 (1924), courts have uniformly determined that, in the absence of an agreement to the contrary, the employee owns the invention unless the employee was hired to employ his inventive skills to create the invention at issue.

64. See *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986), cert. denied, 480 U.S. 947 (1987); *Townsend v. Smith*, 36 F.2d 292, 295 (C.C.P.A. 1929) (defining a conception as the "definite and permanent idea of the complete and operative invention as it is thereafter to be applied in practice that constitutes an available conception within the meaning of patent law"); see also *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994) (stating that a conception is only final if the "idea is so clearly defined in the inventor's mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation").

65. But some argue that the principle of equity no longer applies since it grants employers too valuable a right in exchange for minimal contributions. Mark B. Baker & Andre J. Brunel, *Restructuring the Judicial Evaluation of Employed Inventors' Rights*, 35 ST. LOUIS U. L.J. 399, 407 (1991) (citing the liberal application of the shop right doctrine as the primary reason that equitable principles no longer are a justification for the doctrine and advocating a complete overhaul and transformation of the doctrine to a more employee-friendly one).

Equity is only one of three views justifying the shop right doctrine. A second view stresses that the shop right is an implied contract arising from the employee's implied grant of limited rights in the invention to the employer in exchange for use of the employer's resources. See *id.* A third view, introduced by the United States Supreme Court in *Gill v. United States*, 160 U.S. 426 (1896), states that an employee, having acquiesced and participated in the application of the invention in the employer's business, is thereafter estopped from demanding that the employer cease use of the invention or that the employer pay royalties. In this situation, estoppel acts as a complete defense to a patent infringement action brought by an employee against his employer.

66. This is true regardless of whether or not the employee was hired to invent or employ his creative skills. Note, however, the "employee who is not hired to invent does not implicitly agree to assign any patent, even one created through his employment, because his salary is not intended to be compensation for inventing." Ronald B. Coolley, *Recent Changes in Employee Ownership Laws: Employers May Not Own Their Inventions and Confidential Information*, 41 BUS. LAW. 57, 59 (1985).

67. Consolidated Vultee Aircraft Corp. v. Maurice A. Garbell, Inc., 204 F.2d 946 (9th Cir. 1953) (discussing the amount of money necessary to create a shop right in an employee's invention); *Dewey v. American Stair Glide Corp.*, 557 S.W.2d 643 (Mo. Ct. App. 1977); *Gemco Eng'g & Mfg. Co. v. Henderson*, 84 N.E.2d 596 (Ohio 1949) (stating amount of time spent while on the job sufficiently gave employer a shop right in the employee's invention); see also *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 188-89, amended, 289 U.S. 706 (1933). Some commentators disapprove of implied contracts regarding an outright assignment of a patent based solely on the existence of an employment relationship. See, e.g., 6 DONALD S. CHISUM, PATENTS §§ 22-25 to -26 (rev. ed. 1995); 2 PETER D. ROSENBERG, PATENT LAW FUNDAMENTALS § 11.04[1] (rev. ed. 1995).

in their employees' inventions, most employers draft preinvention assignment agreements. These agreements are standard form contracts in which an employee agrees to assign rights in all inventions made during the term of employment to his or her employer in exchange for a salary and continued employment. The agreements substitute private contractual terms for the disclosure-protection balance struck in patent law.

The standard allocation of ownership—from employee to employer—that preinvention assignment agreements accomplish may frustrate the employees' incentives to maximize their inventive faculties beyond the scope of their jobs.⁶⁸ This frustration exists because the incentive to create, in the form of added compensation for innovative productivity, is not so direct.⁶⁹ Regardless of the efficiency, employers continue to use these contracts. Because the employer has a superior bargaining position, some of the early decisions on the issue viewed the agreements as too overbearing.⁷⁰

Today, however, courts agree that an employee and employer may enter into a binding agreement where the employee agrees to assign interests in future inventions to the employer. Although preinvention assignment agreements are standard in most inventive employment today, they still raise uneasy issues of contract law. Oddly enough, they are

68. Baker & Brunel, *supra* note 65, at 411 (arguing that common law doctrines governing employee-inventors frustrate inventive activity and fail to stimulate innovation).

69. The patent system still serves its purpose even under this scenario since it still acts to encourage the employer to generate inventions by granting exclusive rights in exchange for disclosure. The employer in turn provides the employee the incentive to invent by rewarding the employee with promotions, added benefits, and increased compensation. The employer acts as a kind of "middle-man," enjoying the rewards of patent ownership limited only by its marketing skills.

70. One circuit court stated that an "agreement to assign, in gross, a man's future labors as an author or inventor,—in other words, a mortgage on a man's brain, to bind all its future products,—does not address itself favorably to our consideration." *Aspinwall Mfg. Co. v. Gill*, 32 F. 697, 700 (C.C.D.N.J. 1887).

usually enforced⁷¹ in order to avoid a number of difficult contract issues such as adhesion,⁷² unconscionability,⁷³ adequacy of consideration,⁷⁴ and freedom of contract.⁷⁵

2. Copyright Law's Work-For-Hire Doctrine and Contractual Assignments

Ownership issues regarding employee-generated copyrighted works are primarily governed by the work-for-hire doctrine found in § 101 of the Copyright Act of 1976. A work made for hire usually consists of those works created by employees within the scope of their employment.⁷⁶ The copyright in such a work vests in the employer, who is considered the author for statutory purposes and owns all of the exclusive rights that accompany a copyright, unless an agreement to the contrary exists.⁷⁷ The work-for-hire doctrine is substantively equivalent to the hired-to-invent doctrine.⁷⁸ Whether the

71. For an overview of cases dealing with preinvention assignment contracts over the past century, see William P. Hovell, *Patent Ownership: An Employer's Rights To His Employee's Invention*, 58 NOTRE DAME L. REV. 863, 875-81 (1983).

72. An adhesion contract is one in which one party drafts a contract's provisions entirely for its own benefit without affording the other party a realistic opportunity to bargain, or under such conditions that the other party cannot obtain its desired ends except by acquiescing to the provisions. See John P. Sutton, *Employment Contracts*, in LEGAL RIGHTS OF CHEMISTS AND ENGINEERS 45, 48, 52 (Warren D. Niederhauser & E. Gerald Meyer eds., 1977) (noting that "[t]oday the employment contract is a contract of adhesion"); see also *Cubic Corp. v. Marty*, 229 Cal. Rptr. 828, 834 (Ct. App. 1986). In *Cubic Corp.*, the California Court of Appeals stated that "[t]he determination that a contract is adhesive is only 'the beginning and not the end of the analysis insofar as enforceability of its terms is concerned.'" *Id.* (quoting *Wheeler v. Saint Joseph Hosp.*, 133 Cal. Rptr. 775, 783 (Ct. App. 1976)). In addition, "[a] contract of adhesion can be fully enforced according to its terms unless some other factors exist, such as the oppressive or 'unconscionable' provision." *Id.* (citing *Graham v. Scissor-Tail, Inc.*, 171 Cal. Rptr. 604, 611 (Ct. App. 1981)).

73. Unconscionability refers to an absence of any meaningful choice by one party which, together with the other contract terms, results in an unreasonably favorable outcome for the other party. See *Cubic Corp.*, 229 Cal. Rptr. at 834; *Chretien v. Donald L. Bren Co.*, 198 Cal. Rptr. 523, 525 (Ct. App. 1984). In the context of preinvention assignment contracts, the absence of meaningful choice exists due to the fact that such contracts are used on an industry-wide basis.

74. The difficulty in analyzing the adequacy of consideration stems from the notion that both parties are bargaining for something (rights in the invention) that does not exist at the time of bargaining and that may never exist. Moreover, the likelihood of an economically significant invention is a low-probability event for the employee-inventor. Cherenksy, *supra* note 30, at 624 n.131. Such an invention, however, is a more probable occurrence for the employer who employs many inventors. *Id.* at 623. As a result, the employee-inventor does not consider the assignment clause important when negotiating the employment contract. *Id.* Note that the continued employment asserted as adequate consideration for the assignment of valuable inventions fails, since the employee-inventor who agrees to the preinvention assignment terms yet fails to develop a patentable invention is never held liable for a breach of contract. *Id.* at 624.

75. "Most of contract law is premised upon a model consisting of two alert individuals, mindful of their self-interests, hammering out an agreement by a process of hard bargaining." JOHN D. CALAMARI & JOSEPH M. PERILLO, *CONTRACTS* § 1-3, at 6 (3d ed. 1987). Therefore, freedom of contract may only be "free" when the contracting parties share equal bargaining power. *Baker & Brunel, supra* note 65, at 411 (finding that employee-inventors lack the ability to contract freely with their employers); Cherenksy, *supra* note 30, at 621 (arguing that such a parity in bargaining position rarely exists between employers and their employee-inventors because most employment contracts are offered on a "take-it-or-leave-it" basis).

76. 17 U.S.C. § 101.

77. *Id.* § 201(b) (1994).

78. The work-for-hire doctrine is, in form, indistinguishable from the hired-to-invent doctrine aside from the context of applicability. Under the work-for-hire doctrine, the author—the one to whom the work owes its creation—is not credited, in form. See *supra* note 49. The "author" under the work-for-hire doctrine is the employer. See 17 U.S.C. § 201(b). As a result, and due in part to the informal nature in which the copyright law system operates, the "true" author goes unrecognized. Under the hired-to-invent doctrine, however, the patent filed in the United States Patent and Trademark Office contains the name of the individual responsible for the invention identified as the inventor. Because a patent may only be granted to an individual and not an entity, the individual employee is at least recognized on the patent as the "true" inventor. See 35 U.S.C. §§ 116, 118 (1988).

copyrightable material produced by an employee is a work for hire is critical in determining who owns the exclusive rights. In an effort to avoid conflicts, employers often draft, and require their employees to sign, contractual assignment agreements which act as the mechanism for transferring those copyrights vesting initially in the employee to the employer. These agreements suffer the same difficulties that the preinvention assignment agreements suffer in patent law.⁷⁹

While the contractual assignment agreements share the same difficulties regardless of whether the context is patents or copyrights, and the work-for-hire doctrine in copyright law is substantively indistinguishable from patent law's hired-to-invent doctrine, copyright law clearly lacks a doctrine even remotely analogous to patent law's shop right doctrine. Although the shop right often proves to be profitless to the employer in the patent law context,⁸⁰ an extension of the doctrine into copyright law may prove to be of some value to the university-employer.⁸¹ A discussion and analysis of an extension of the shop right doctrine into copyright law is beyond the scope of this Note. It suffices to say that under the current system of assigning ownership rights within employer-employee relationships, the employer is clearly in a better position.

III. OWNERSHIP OF FACULTY-GENERATED INTELLECTUAL PROPERTY

For years, both faculty and university administrators assumed that the university, as the employer, owned the faculty's research.⁸² It was not until professors actually became aware of their inherent legal right to their creations that they began to voice their displeasure. These cries often went unheard, however, until faculty organized their own committees and took part in the revision process of university intellectual property policies. The current system of ownership in faculty-generated inventions is not perfect. The following overview will cite some of the problems in the universities' claims to ownership in faculty-generated creations.

A. Patents

In addition to their teaching and administrative duties, most professors are hired to conduct research within a specified discipline that draws on the inputs of other professors, students, and other university resources. In conducting research, professors may create patentable subject matter. The university justifies its ownership claim to these patents by arguing that faculty who use university equipment, time, and personnel in

79. See *supra* notes 68-75 and accompanying text.

80. See *supra* text following note 67; *infra* note 89 and accompanying text (suggesting that despite possessing the resources to make and use the invention, the employer, such as a university, which lacks the capabilities to sell the invention, is left with an inalienable right).

81. A nonexclusive, royalty-free, nontransferable license to reproduce and distribute the copyrightable subject matter in the university community may at least serve some educational purpose.

82. See Pat K. Chew, *Faculty-Generated Inventions: Who Owns The Golden Egg?*, 1992 WIS. L. REV. 259, 261-62 (stating that "[d]espite what is generally assumed, long established legal principles grant to employees, such as faculty, the inherent right of ownership to their inventions" and that "this inherent right is abrogated only by an explicit agreement").

developing their inventions should be classified as employees hired to invent.⁸³ The United States Supreme Court elaborated on the hired-to-invent doctrine and its applicability in *United States v. Dubilier Condenser Corp.*,⁸⁴ when Justice Roberts stated that:

One employed to make an invention, who succeeds, during his term of service, in accomplishing that task, is bound to assign to his employer any patent obtained. The reason is that he has only produced that which he was employed to invent. His invention is the precise subject of the contract of employment. A term of the agreement necessarily is that what he is paid to produce belongs to his paymaster. On the other hand, if the employment is general, albeit it cover a field of labor and effort in the performance of which the employee conceived the invention for which he obtained a patent, the contract is not so broadly construed as to require an assignment of the patent.⁸⁵

The broad assertion that one is hired to invent is tenuous because employment contracts rarely detail what an employee is hired to invent. Moreover, if the employee develops a patentable invention years after commencing employment, the employer's assertion will act to unfairly appropriate from the employee rights in an invention that may not even remotely resemble the character of the invention sought when the employment contract was formed. It is now accepted, however, that so long as the employee's contract of employment defines the area of activity with sufficient specificity, the employer will own inventions where the employee is "employed to plan and conduct fundamental and practical investigations" that lead to an invention.⁸⁶

The issue of whether faculty are, as a class, hired to invent, is unsettled and hinges on the facts of each case.⁸⁷ In those cases where faculty are not deemed to have been hired to invent, universities consistently claim that use of university facilities or equipment, resources such as graduate students, and funds for filing patent applications are sufficient grounds for forcing faculty to relinquish their ownership interests. Although the university has a strong claim to a shop right in the invention,⁸⁸ it is the control of the invention above and beyond the shop right, in the form of an ownership interest in the patent, that is the lucrative component. A university rarely has the facilities, resources,

83. *Id.* at 262. ("Universities' various rationales, however, are questionable, and they do not justify universities' ownership rights. The [universities' intellectual property] policies themselves may not even be enforceable.")

84. 289 U.S. 178, *amended*, 289 U.S. 706 (1933).

85. *Id.* at 187 (citations omitted).

86. ROSENBERG, *supra* note 67, § 11.04, at 11-28 to -29; *see also* Houghton v. United States, 23 F.2d 386, 390 (4th Cir.), *cert. denied*, 277 U.S. 592 (1928) (stating that "[a]n employee, who undertakes upon the direction of his employer to solve a specific problem within the scope of his general employment, is as truly employed and paid for the particular project as if it had been described at the outset in the contract of employment").

87. *See* University Patents, Inc. v. Kligman, 762 F. Supp. 1212 (E.D. Pa. 1991) (holding that employment handbooks outlining terms of tenure could be used to create a preinvention assignment agreement and declining to address the issue of whether the university professor was hired to invent); Speck v. North Carolina Dairy Found., Inc., 319 S.E.2d 139 (N.C. 1984) (holding that the professors and researchers who used university resources to develop a patentable process were hired to invent and that their invention belonged to the university since they developed the process while engaged in research and development for the university).

88. The mere fact that the university provided the financial resources to acquire a patent does not, in and of itself, create a shop right; it is merely considered as evidence that the employee implicitly agreed to grant a shop right. *See, e.g.,* Womack v. Durham Pecan Co., 715 F.2d 962, 969 (5th Cir. 1983) (holding that the employer acquired a shop right despite the fact that the employee funded the patent application procedure himself). The key factor in determining whether the employer acquires a shop right is not the employer's assistance, but the employee's consent. *Id.*

and general know-how to market the invention and, therefore, cannot gain the economic rewards that accompany an invention's exploitation.⁸⁹ Moreover, a university by law may not take full advantage of the shop right doctrine in the form of commercial sales if it is not in the business of dealing in such a manner. Ownership of the patent provides the legal right to license the invention to others who have the facilities, resources, and marketing skills to exploit the invention. The patent owner enjoys the rewards of the licensing schemes while the employer retains the shop right, which is a less economically significant interest, especially for a university.

A university's claim to ownership interests in a faculty-generated creation should fail for three reasons. First, faculty rarely agree explicitly to trade their use of university resources for the university's right to own the proprietary rights in their creations.⁹⁰ Second, the basic provisions of a faculty member's employment are usually negotiated through written correspondence that normally only outlines job responsibilities and rarely discusses research projects.⁹¹ The written correspondence, therefore, lacks specific language that could support a conclusion that the faculty member has been hired to invent or that the faculty member agreed to assign rights in his or her research.⁹² Third, assuming arguendo the fact that this specific language exists, it should be construed against the university since the university drafted the contract.⁹³ Although the three reasons set forth here support a conclusion that faculty, and not the university, own faculty-generated inventions, it should come as no surprise that universities, as the employers, exert ownership rights.

Most faculty are not only unaware that, as a matter of law, they have original ownership rights to many of their creations, but are also unaware of their rights constituting such ownership.⁹⁴ Moreover, universities have an economic interest in keeping this vital legal information from faculty members. Therefore, faculty could argue that there is no meeting of the minds between the university and themselves, one of the first requirements for a binding contract.⁹⁵ These additional facts also support the

89. One commentator believes that a university would be better served if faculty members reimbursed the university for the resources used instead of retaining any shop rights. Chew, *supra* note 82, at 270. Professor Chew's proposal makes sense because universities often lack the resources needed to take full advantage of a shop right. Thus, shop rights for these universities only serve to facilitate future research.

90. *Id.* at 269. Both parties accept the risk that the faculty's research may not be economically successful. "The faculty, with their professional careers at stake, are more regretful about their lack of success than is the university. If the faculty's research is successful, perhaps even wildly so, then that is the windfall that the parties hoped for but were not guaranteed." *Id.* at 269 n.40.

91. *Id.* at 288.

92. *University Patents, Inc. v. Kligman*, 762 F. Supp. 1212 (E.D. Pa. 1991) (holding that employment handbooks outlining additional terms of employment could be used by the employer to establish the existence of a preinvention assignment agreement).

93. Chew, *supra* note 82, at 288-89; see also RESTATEMENT (SECOND) OF CONTRACTS § 206 (1981).

94. One recent study discovered a "surprising number of instances in which inventors voluntarily surrendered all patent rights and financial returns from inventions." MATKIN, *supra* note 8, at 301. The reluctance of faculty to become involved in the often time-consuming patent process may reflect the poor procedural administration of university intellectual property policies. Most of the faculty members that participated in the study, however, recognize the importance of technology transfer activities and relations with industry and believe that they are important enough to justify the significant time commitments. *Id.* at 302.

95. Chew, *supra* note 82, at 289; see also RESTATEMENT (SECOND) OF CONTRACTS, *supra* note 93, §§ 3, 18, 19, 69. Technology transfer policies are usually drafted by the university and lack the personal negotiation that strengthens the provisions of a contract. Moreover, when faculty are hired, they are not always familiar with the policy relating to the assignment of their research. "Even if they are aware of the existence of a policy, it is unlikely they understand the

conclusion that the university lacks the authority to assert an ownership interest in the invention beyond that of a shop right.⁹⁶ However, one university technology transfer administrator recently noted:

"You've got to understand the way it is at universities. Universities do not look at legal niceties. Their attitude is that faculty won't sue them. Like in business, the university is the employer and they own faculty work. On the other hand, they do not want to push the issue since some really vocal faculty might complain. Most faculty are oblivious to their rights. [Even] if they did know their rights, they would be afraid to push it . . . so the university's position is not tested."⁹⁷

The same hired-to-invent arguments universities assert to support their claim to ownership in faculty-generated inventions are also asserted in defense of their use of preinvention assignment agreements. However, the advent of state employee-invention statutes may begin to limit the enforceability of preinvention assignment agreements in these contexts.⁹⁸ These statutes void any preinvention assignment agreement that requires an employee to assign to the employer rights in those inventions created without the use of any of the employer's resources, supplies, or equipment or those inventions that are developed on the employee's own time, or that are unrelated to the employer's actual or potential research areas. Even if these statutory regulations do not ease the inequities, the faculty member, like any other inventor, may still dedicate the invention to the public by disclosing the invention in one of a variety of ways, such as disclosing the description and details of the invention in a printed publication.⁹⁹

Aside from the traditional difficulties that employees face confronting the preinvention assignment agreements and hired-to-invent doctrine, a professor's plight is pronounced in one significant way: The nature of the university-professor relationship is different from the ordinary employer-employee relationship. The professor opts to forgo the fast-paced and often stressful environment found in an industrial research and development department and the high salary that accompanies that position. Instead, professors are attracted to the chance to pursue similar interests in an academic arena where they are also endowed with freedom to research topics of their choice. Because faculty research schedules are considered the professor's own prerogative, the university, as the employer, has a weaker case when it asserts that the faculty member was hired to invent. University

significance of the university's claim to ownership to their inventions." Chew, *supra* note 82, at 289.

96. See *Regents of the Univ. of Colo. v. K.D.I. Precision Prods., Inc.*, 488 F.2d 261 (10th Cir. 1973); *University Patents*, 762 F. Supp. 1212; *Speck v. North Carolina Dairy Found., Inc.*, 319 S.E.2d 139 (N.C. 1984).

97. Chew, *supra* note 82, at 281 (quoting an anonymous source).

98. This is especially true where the institution is a public university and its faculty are considered state employees. For examples of state employee-invention statutes, see CAL. LAB. CODE § 2870 (West 1989); ILL. ANN. STAT. ch. 762, para. 1060/2 (Smith-Hurd 1993); MINN. STAT. ANN. § 181.78 (West 1993); N.C. GEN. STAT. §§ 66-57.1 to .2 (1992); WASH. REV. CODE ANN. § 49.44.140 (West 1990). See generally Coolley, *supra* note 66.

99. This could raise ethical issues between a professor and the university. The professor motivated by altruistic rather than economic beliefs could effectively undermine the university's interest in the profits accompanying commercial exploitation of the invention by dedicating the invention to the public through publication. The university must proceed with caution in such a case. An attempt by the university to limit the professor's ability to disclose the invention in this manner through contractual agreements may cast doubts on the university's goals of promoting academic freedom, generating information, and freely disseminating that information. See J. H. Reichman, *Overlapping Proprietary Rights in University-Generated Research Products: The Case of Computer Programs*, 17 COLUM.-VLA J.L. & ARTS 51, 92 (1992) (stating that "universities are well advised to acknowledge expressly that a faculty member's decision to publish research results . . . always trumps any commercial interests that the university intends to exercise" (citation omitted)).

employment contracts, as do most employment contracts, fail to detail what the faculty-employee is hired to invent; in addition, they cannot detail what the faculty member's research agenda will be. Therefore, the university's claim under the hired-to-invent doctrine is substantially weaker than a similar claim by a nonacademic employer.

B. Copyrights

Despite the inapplicability of the hired-to-invent doctrine in the university-faculty context, and notwithstanding the similarities between the hired-to-invent doctrine and copyright law's work-for-hire doctrine,¹⁰⁰ a professor's copyrightable creations can be considered works for hire. Along with their teaching and administrative duties, professors are hired to conduct research. The nature of the profession creates the expectation that professors will, at least, publish works in their field of interest.¹⁰¹ The frequency with which a faculty member publishes and the quality of such publications have now become two criteria upon which tenure and salary decisions are made. Such an expectation rises to the level of a job responsibility; therefore, faculty-created works may be seen as works for hire since the university insisted upon their generation.¹⁰²

A faculty member may object to the work-for-hire doctrine, arguing that the university employment contract not only fails to detail what the faculty-employee is hired to publish, but cannot detail what the faculty member's research agenda will be due to the academic freedom that faculty enjoy. This objection, however, falls on deaf ears since application of the work-for-hire doctrine is not contingent upon the employer detailing in advance what the employee is hired to create.¹⁰³

Those who believe that university faculty are hired to teach and conduct research, but are not bestowed with a duty to produce copyrightable works for their university, maintain that universities lack the power to control the production of such works without violating the principles of academic freedom.¹⁰⁴ Moreover, faculty-generated copyrightable computer programs and software do not fall within the scope of employment since they are rarely prepared for the direct use by, or benefit of, the university. This view is consistent with the academic researcher exception to the work-

100. See *supra* note 78 and accompanying text.

101. The nature of the profession has not yet approached the level where faculty are expected to bring in patents as frequently as they are expected to publish.

102. Lape, *supra* note 10, at 233. But see Rochelle Cooper Dreyfuss, *The Creative Employee and the Copyright Act of 1976*, 54 U. CHI. L. REV. 590, 597 (1987) (stating that although universities employ faculty, require research as a condition for employment, and provide resources to carry out research, such actions still fail to establish the university as "the motivating force behind the work").

103. See 17 U.S.C. § 101.

104. Notwithstanding the fact that faculty publish as part of their employment responsibilities and use university resources and supplies, the "universal assumption" prior to the Copyright Act of 1976 was that the faculty are entitled to the copyright. *Hays v. Sony Corp. of Am.*, 847 F.2d 412, 416 (7th Cir. 1988). The *Hays* court suggested that faculty own copyrights in works they create, notwithstanding the fact that the works are created during "school time [and] for school purposes" and would ordinarily be considered a work for hire. *Id.* at 416-17. The court cited the academic researcher exception to the work-for-hire doctrine under the 1909 Copyright Act, finding an "absence of any indication that Congress meant to abolish" the academic researcher exception in passing the Copyright Act of 1976. *Id.*

for-hire doctrine under the Copyright Act of 1909.¹⁰⁵ Because the Copyright Act of 1976 is simply a codification of federal copyright law as it stood in 1976, some argue that the academic researcher exception survived the 1976 Act due to a failure to explicitly remove it.¹⁰⁶

Because a faculty work may not be deemed work for hire, thereby bestowing the faculty with the ownership rights in the copyright,¹⁰⁷ universities may require their faculty to assign the ownership of all copyrights in works created during the course of employment. Such a requirement could take the form of a contract clause similar to the preinvention assignment agreement. Courts consistently enforce these clauses notwithstanding the fact that they often raise the same difficult contract issues that preinvention assignment agreements raise.¹⁰⁸ The professor may transfer the copyright only by a writing that complies with § 204(a) of the 1976 Act. Written intellectual property policies in which universities assert ownership of certain works may satisfy the § 204(a) requirements if they are incorporated by reference in the employment contract signed by the parties.¹⁰⁹ If the faculty work is indeed a work for hire then, under § 201(b), the copyright vests in the university upon the creation of the work.¹¹⁰

105. In addressing the issue of whether a professor's work was one made for hire, two cases, *Williams v. Weisser*, 78 Cal. Rptr. 542 (Ct. App. 1969), and *Sherrill v. Grieves*, 57 Wash. L. Rep. 286 (D.C. 1929), in keeping with policy and custom, held that such works were not works for hire.

106. One commentator, after a thorough investigation, concludes that the Copyright Act of 1976 "did not disturb the professors' exception from the work-made-for-hire doctrine; to the extent that such an exception ever existed, it continues to exist." Lape, *supra* note 10, at 246; *see also Hays*, 847 F.2d at 416-17. *But cf. Leonard D. Duboff, An Academic's Copyright: Publish and Perish*, 32 J. COPYRIGHT SOC'Y 17, 33 (1985) (arguing that portions of the 1976 Act indicate a trend toward abolishing the application of custom); Todd F. Simon, *Faculty Writings: Are They "Works Made for Hire" Under the 1976 Copyright Act?*, 9 J.C. & U.L. 485, 507 (1983) (arguing that the 1976 Act abolished the academic researcher exception and preempts the common law). Professor Lape believes that these analyses are "logically flawed and therefore fail to support the conclusion drawn from them." Lape, *supra* note 10, at 240.

The argument that the 1976 Act abolishes the academic researcher exception serves to support the proposition that universities, through the advent of intellectual property policies, are increasingly appropriating more and more property from their faculty. If the exception did not survive the 1976 Act, then universities would be entitled to more property after the 1976 Act than prior to the 1976 Act. However, university policies are more prevalent today than ever before. Universities preface their policies by noting that the arrival of new technology, an increased interest in faculty creations, and the accompanying economic rewards in the commercialization of such creations are among the primary reasons for asserting an ownership interest in faculty works. *See, e.g., GUIDE TO THE OWNERSHIP, DISTRIBUTION AND COMMERCIAL DEVELOPMENT OF M.I.T. TECHNOLOGY* (Patent and Copyright Policy Statement) (1989); *HARVARD UNIVERSITY FACULTY OF ARTS & SCIENCES, PRINCIPLES AND POLICIES THAT GOVERN YOUR RESEARCH AND OTHER PROFESSIONAL ACTIVITIES 1* (1992); *THE OHIO STATE UNIVERSITY, POLICY ON PATENTS AND COPYRIGHTS 1* (1989); *STANFORD UNIVERSITY, RESEARCH POLICY HANDBOOK 86, 92-95* (1989); *THE UNIVERSITY OF ILLINOIS, THE GENERAL RULES CONCERNING UNIVERSITY ORGANIZATION AND PROCEDURE 7, 10* (1991).

107. 17 U.S.C. § 201(a) ("Copyright in a work protected under this title vests initially in the author or authors of the work.")

108. *See, e.g., Weinstein v. University of Ill.*, 811 F.2d 1091, 1094 (7th Cir. 1987); *Regents of the Univ. of Colo. v. K.D.I. Precision Prods., Inc.*, 488 F.2d 261, 269 (10th Cir. 1973); *see also supra* notes 71-75.

109. *See* 17 U.S.C. §§ 201(b), 204(a); Lape, *supra* note 10, at 248-50 (noting that a failure to incorporate the university copyright policy by reference into the signed employment agreement satisfies neither § 204(a) nor § 201(b) since there is no evidence that a grant was ever made).

110. 17 U.S.C. § 201(b) (stating that the employer, considered as the author, owns all of the rights comprised in the copyright "unless the parties have expressly agreed otherwise in a written instrument signed by them").

IV. OWNERSHIP OF STUDENT-GENERATED INTELLECTUAL PROPERTY

Although today's faculty enjoy more of the benefits that accompany ownership rights in intellectual property, the system is not perfect. The issues discussed in Part III, along with others, exist when considering the ownership rights to which graduate students are entitled in student-generated creations. This Part examines those same issues and discusses the justifications universities assert in support of their claim to ownership rights in student-generated inventions. Part IV.A states the reasons why graduate students are not "employees" and, as a result, are not subject to the hired-to-invent or work-for-hire doctrines. Part IV.B examines the university's administration of intellectual property policies and how it may be stifling the creativity of students. Part IV.C explains why a university's use of preinvention assignment agreements should not bind a student.

A. Students, Not Employees

Courts generally hold that when the student creates material entitled to protection under federal intellectual property laws while engaged in educational or training activities, "the autonomy of the university prevails and the student is not afforded the status of employee."¹¹¹ The student is just that—a student. Thus, in most educational settings the student will not be classified as an employee. The fact that the university-student relationship is not an employer-employee relationship precludes a conclusion that the university may be entitled to the student-generated patentable invention under the hired-to-invent doctrine.¹¹²

In a typical application of the doctrine, an employee gives the employer rights in the future inventions and the accompanying patent rights in exchange for employment. The student, however, does not agree to relinquish the patent rights in a student-generated invention in exchange for a stipend, laboratory exposure, and classroom instruction. The student more likely believes that his or her participation in aiding the faculty in their research and instructional duties is the quid pro quo for the stipend, laboratory exposure, and classroom instruction.

Although graduate students are frequently paid stipends to defray the costs of tuition, these stipends are not analogous to the compensation an employee might receive. The student's purpose in her affiliation with the university is first, and most importantly, educational. The work in which the student participates should be viewed as part of the educational experience because that work is typically conducted in pursuit of degree certification requirements. The graduate student is unlike a professor in that the student, while she may be expected to "work" as a research aide or teaching assistant, does not have clearly defined responsibilities. Moreover, unlike a faculty member, the graduate

111. Kathleen M. Capano et al., Note, In re Cronyn: *Can Student Theses Bar Patent Applications?*, 18 J.C. & U.L. 105, 115 (1991).

112. Because the student is not an employee, nor *hired* to do anything, the conditions needed to conclude one has been hired to invent are absent. See *supra* notes 84-87 and accompanying text. o

student is not expected to generate, on a regular basis, the type of information expected of a professor.

The issue of whether a student is an employee of the university usually arises when the student attempts to take advantage of workers' compensation benefits. In these cases, courts define "employee" very narrowly. These judicial definitions are typically based on the specific facts of each case and the corresponding areas of law such as agency law,¹¹³ the Fair Labor Standards Act,¹¹⁴ and federal and state tax law,¹¹⁵ to name a few. Considering the nature of graduate students' relationship with their university—the primary purpose being educational, the short-term relationship, and no clearly defined responsibilities other than successful completion of degree certification program—the graduate student simply does not fit the definition of an employee hired to invent or create.¹¹⁶

B. Graduate Students' Diminished Incentives to Create

Students choosing universities, and in particular graduate departments, base their decisions upon the congruence between personal interests and the substance of the graduate program. The prospective graduate student possessing a bachelor's degree in chemical engineering may choose school A over school B due to the former's concentration in chemical kinetics. Another student may choose school B over school A due to school B's concentration in thermodynamics. While students faced with a choice of schools consider the substance of the programs offered, they normally do not take into consideration the intellectual property policy that each university enforces. Most graduate program brochures do not even discuss such policies. Students discover these policies at

113. The fact that the university may be liable under the doctrine of respondeat superior may lead a court to conclude that a student is an employee. *But see* *Ross v. University of Minn.*, 439 N.W.2d 28, 33 (Minn. Ct. App. 1989) (holding that a resident in the University of Minnesota psychiatry residency program is a student rather than an employee for purposes of a decision to dismiss the resident for academic reasons despite the fact that the resident's tenure exhibited many characteristics of an employee).

In *Community for Creative Non-Violence v. Reid*, 490 U.S. 730 (1989), the United States Supreme Court concluded that one must consult § 220 of the Restatement (Second) of Agency when determining whether a hired party is an employee for purposes of the Copyright Act. A court will consider a variety of factors when determining the status of the hired party. These factors include location of work, type and duration of the relationship between the parties, method of payment, skill required, source of the financial resources and tools, and whether the work is part of the regular business of the hiring party. Note that none of these factors are determinative. *See* *Hilton Int'l Co. v. NLRB*, 690 F.2d 318, 321 (2d Cir. 1982).

114. *Donovan v. American Airlines, Inc.*, 514 F. Supp. 526, 531-32 (N.D. Tex. 1981), *aff'd*, 686 F.2d 267 (5th Cir. 1982) (holding that flight attendant trainees and reservation sales agent trainees are not "employees" for purposes of the Fair Labor Standards Act while training at a facility (1) where the skills acquired are similar to those that could be gained at a vocational school; (2) where regular employees are not displaced by the trainees; (3) where the employer derives no immediate advantage from the training activities; and (4) where the trainees are not entitled to employment at the conclusion of the training period and are not compensated in the form of wages during the training period).

115. Courts consider whether the student received compensation for the work allegedly performed as an employee and whether any portion of such compensation is withheld for the purposes of federal, state, or local income tax and social security coverage. *See* *Regents of the Univ. of Mich. v. Michigan Employment Relations Comm'n*, 204 N.W.2d 218, 225 (Mich. 1973) (holding that interns, residents, and postdoctoral fellows are employees for purposes of the Public Employees Relations Act and consequently have the power to form a labor organization in order to negotiate with hospital administrators regarding compensation and employment conditions). The receipt of fringe benefits available to other employees, such as health coverage, is also pertinent to students' classification as employees. *Id.*

116. *See supra* notes 83-87 and accompanying text.

the most inopportune moments: when beginning research, while conducting research, or upon the realization that they have developed subject matter worthy of protection under federal patent or copyright law. Perhaps this should come as no surprise to students. After all, nearly all universities administer policies in one form or another. What seems surprising, however, is that universities claim full ownership rights in these student-generated creations while lacking the legal authority to do so.

A graduate student whose university chooses to rely solely on its patent policy to claim an ownership interest in the invention can make two strong arguments. First, the student can argue that the university's failure to issue copies of its policy in a timely manner¹¹⁷ precludes it from asserting an ownership interest. Providing a copy of the policy just before the student begins the activities which lead to the invention unfairly puts the student in a difficult position. Most students have no need to give the policy a second look since they do not know beforehand whether they will ever create anything patentable. Furthermore, the nature of patentable subject matter itself, which contains "nonobviousness" as a prerequisite to a patent grant,¹¹⁸ makes the future need for patent acquisition an unanticipated event. Second, the student can argue that the element of unconscionability precludes any assignment in interest. To say that the university enjoys a superior bargaining position would be an understatement. The student who is aware of her potential to create some sort of material worthy of patent protection is in no position to bargain with the university over ownership rights.

The consequences of waiting to give students notice of the policy until after they have chosen to enroll in the university's program leaves the student with two options: she can either leave the program or continue with the program. The former is hardly an option, since the student must expend time and money to apply to another university, thus delaying graduation, not to mention the fact that whatever university she settles on will no doubt enforce a similar policy. The latter option, acknowledging the policy and continuing with the program, creates two possible results. First, the student and her desire to maximize her creative potential may be undisturbed. In such a case, the university and society would be the clear winners should the student create patentable subject matter. The student, however, is the loser since the rewards that she rightfully deserves now belong to the university. If, on the other hand, the student and her determination to maximize her creative potential become inhibited, society would miss out on the prompt disclosure of the student's idea.¹¹⁹ The university also fails in its mission to encourage the generation and dissemination of knowledge for the benefit of the university community and society as a whole. The student, by concealing her invention until after her relationship with the university ends, risks only the possibility that other inventors, through their own independent creation, may patent the invention first. This is a risk the

117. Issuance in a timely manner might include submission with admissions material or with the notice of acceptance.

118. See *supra* notes 40-44 and accompanying text.

119. The public may also miss out on the invention if the student is so frustrated that she never attempts to develop a patentable invention.

student may be willing to take, since this is the only way for her to enjoy the rewards of her mental labor.¹²⁰

C. The Inequities and Inapplicability of Preinvention Assignment Agreements

The possibility that one student in a group of one hundred will develop a patentable invention may or may not be high; however, the likelihood that a particular student will develop a patentable invention is much lower. Because predicting which student out of the group of one hundred may invent patentable subject matter is too difficult, a university might require all one hundred to sign preinvention assignment agreements.¹²¹ Currently, students are typically not required to sign intellectual property assignment agreements unless *employed* as research assistants.¹²²

Those universities which require, or might require, their students to sign preinvention assignment agreements as a prerequisite to participating in laboratory and research activities may partially avoid the stigma of inequitable conduct discussed above if the agreements are presented and signed in a timely manner.¹²³ However, the preinvention assignment agreement in the university/student context cannot elude the difficult contract issues of adhesion, unconscionability, adequacy of consideration, and freedom of contract discussed above.¹²⁴ The fact that the parties are a university and a student, as opposed to an employer and an employee, only exacerbates an already troublesome form of assigning ownership rights. The elements of adhesion and unconscionability are more identifiable here than in the case of a university-faculty relationship since faculty are, at the least, in a better position to bargain with their university.¹²⁵

The adequacy of consideration is also an issue in a university-student relationship. The student's primary purpose in her affiliation with a university is educational. The student typically agrees to participate as a research or teaching assistant in exchange for the exposure to a research atmosphere and educational experience. Allocating the ownership rights in a student-generated invention absent additional consideration does not appear

120. Moreover, the United States does not follow a first-to-file rule, which awards a patent to the first one to file an application with the United States Patent and Trademark Office; thus, the risk is more apparent than real. Under the first-to-invent rule followed by the United States, an inventor need only show diligence in reducing the invention to practice from the time immediately preceding the second inventor's entrance into the field in order to acquire the patent. *Hull v. Davenport*, 90 F.2d 103, 105 (C.C.P.A. 1937). A student may argue that she lacked the funds to reduce her invention to practice or file and as a result was not able to file sooner. Courts have recognized similar arguments in upholding the first conceiver's right to the patent. See *Foster v. Magnetic Heating Corp.*, 297 F. Supp. 512 (S.D.N.Y. 1968), *aff'd on other grounds per curiam*, 410 F.2d 12 (2d Cir.), *cert. denied*, 396 U.S. 829 (1969). For a discussion on a proposed change from the first-to-invent rule to a first-to-file rule, see MacCordy, *supra* note 38, at 297-302.

121. See *supra* note 74.

122. Many participate as research assistants for course credit. These students are not *employed* as research assistants. In fact, some must pay the tuition fee corresponding to the number of course credits in order to act as research assistants.

123. See *supra* notes 117-18 and accompanying text.

124. See *supra* notes 72-75 and accompanying text.

125. Those faculty members possessing research traits and skills marketable in industry can leave the university for more lucrative positions as many have already done in the engineering and computer science fields. Lape, *supra* note 10, at 267. The university allocation of ownership rights contributes to the flight of bright individuals from universities in search of more recognition and compensation. See Robert L. Jacobson, *Low Pay and Declining Working Conditions Seen Threatening Colleges' Teacher Supply*, CHRON. HIGHER EDUC., Mar. 27, 1985, at 21 (reporting that leaving academia for professional careers in industry has become a trend in recent years).

justifiable. A student, who on her own time and effort, uses university laboratory equipment and computers to conceive or develop an invention appears to inflict little harm on the university. In fact, the student's actions are consistent with a university goal of generating knowledge for the benefit of society. The expense a university incurs is the risk of liability for any damage to the resources or injury to the student. Universities, no doubt, view the continued exposure to research activities and classroom instruction as adequate consideration for an assignment of ownership rights. This view is defective, however, since the student who fails to develop a patentable invention is never held liable to the university for a breach of contract.¹²⁶

The issue of freedom to contract invariably arises when universities require students to sign preinvention assignment agreements. Parity in bargaining power, typically found when freedom to contract exists, is usually absent in the employer-employee relationship since most standard employment contracts are offered on a take-it-or-leave-it basis.¹²⁷ The offer of admission into a university certified degree program is a standard invitation also offered on a similar take-it-or-leave-it basis. Because the student will encounter the same sorts of agreements at other universities, she too lacks the equality in bargaining power an employee lacks.

There are three conclusions to be drawn from this Part. First, unless the student is an employee of the university hired to use her creative or inventive skills, the university should have no ownership claim in the intellectual property created by the student regardless of whether the student used university resources and supplies. The university, at most, may acquire a shop right in such an instance. Second, current university intellectual property policies may be inhibiting rather than stimulating creativity among graduate students. Third, the preinvention assignment agreements, which raise complex and troublesome issues of contract law in the employer-employee relationship, are no more justifiable in the university-student relationship since the student is in no better a position than a faculty member when he negotiates his rights. Under current patent, copyright, and contract law, graduate students have a much stronger case for ownership rights than do faculty. However, in the university community students enjoy practically no rights.

V. RECOGNIZING GRADUATE STUDENTS' OWNERSHIP RIGHTS IN INTELLECTUAL PROPERTY

This part of the Note sets forth additional arguments for providing graduate students with ownership and attribution rights in intellectual property. Part V.A provides nonlegal reasons for recognizing graduate students' rights. Part V.B suggests that university administrators and professors should take the initiative to change the current system since they are in the best position to do so and maintain a strong interest in ensuring the continued flow of research grant monies. Part V.C dispels some of the contingencies that would accompany individual student ownership and management of intellectual property.

126. *Cf.* Cherenksy, *supra* note 30, at 624 n.131.

127. *See supra* note 75.

Finally, Part V.D examines some of the harsh financial consequences of universities' failure to recognize graduate students' ownership rights in patents and copyrights.

A. Fairness and Equity

So far, this Note has focused on the legal reasons why students are entitled to ownership in student-generated intellectual property. In addition to these legal reasons are arguments of fairness and equity. Although the graduate student did not enroll in a graduate degree program to create or invent anything, the university should not inhibit whatever creativity the student may possess. The allocation of ownership rights in student-generated intellectual property from the student to the university does just that. Rewarding the student with high grades for her work in developing patentable subject matter is little consolation when the university is receiving millions of dollars for the student-generated invention. The student created the work that was entitled to protection; therefore, it is only fair that the student should reap the rewards of her creation.

Universities are not the sole perpetrators of inequities. Consider the situation where a graduate student conducts years of research under the supervision of an absentee faculty advisor. If the student develops a patentable invention, the faculty advisor may claim some ownership right in the invention. Under the current university system of allocating ownership rights, the university and the professor would share in the licensing and royalties. The student would be left with little more than the gratification that comes from participating in a successful research endeavor. This is not to suggest that faculty are taking ownership rights from students.¹²⁸ If the faculty's claim fails, because the university learns it was the student who was responsible for the invention, the university will exert full ownership rights in the intellectual property. It is just another example of how students are not reaping where they have sown. Ultimately, this limits the generation and dissemination of knowledge, and inhibits creativity and inventive activity.

The Constitution gave Congress the power to promote the progress of science and useful arts. Congress exercised this power by enacting the Patent Act of 1952 and the Copyright Act of 1976. These Acts provide individuals with the incentives to invest their time and effort to create for the benefit of society. The current system of ownership rights in student-generated inventions is inconsistent with the underlying theme of promoting the progress of science and useful arts. The following Parts suggest that the only fair way to recognize graduate students' intellectual contribution to society is to provide them with the ownership and attribution that accompany other inventors and creators. Providing graduate students with these rights gives them the incentive to contribute even more. Moreover, because the nation is currently turning more frequently to universities for

128. It is not unreasonable, however, to think that a faculty member may commit fraud in appropriating information worthy of intellectual property protection from the graduate student, since the amount of material the faculty member publishes weighs heavily on whether he will obtain tenure. See Bok, *supra* note 17, at 310; Bill L. Williamson, *Using Students: The Ethics of Faculty Use of a Student's Work Product*, 26 ARIZ. ST. L.J. 1029, 1039 (1994) (discussing the pervasive practice in American education, and in law schools in particular, through which professors advance their careers at the expense of their students and, in doing so, teach students that theft is not only acceptable but often rewarded); see also 60 Minutes: *Get Real* (CBS television broadcast, Feb. 26, 1995) (discussing a trend toward using graduate students to teach college classes in place of professors, as professors focus instead on research duties in order to gain tenure).

technological advances, recognizing these rights will not disturb the role universities play.

*B. A Transformation from Within the System to Account
for Students*

For years, universities treated faculty-generated intellectual property as its own. As a result of universities' organizational frameworks, policy changes did not begin until professors and research sponsors objected. Today, most universities cite their cooperation with faculty commissions as the means to developing more equitable intellectual property policies. University professors' efforts in consolidating their individual goals and concerns, as well as the fact that they are, after all, employees, provided them with the ability to form committees that forced changes in the old intellectual property policies. Graduate students, on the other hand, face problems that faculty did not have to consider.

Because graduate students are not employees,¹²⁹ they retain even less bargaining power regarding ownership rights than faculty. Due in part to the fact that they are not employees, graduate students are severely limited in their ability to form an organization or committee that could oversee their rights. Another reason for this limitation is that graduate students are affiliated with the university for a relatively short period of time. Their inability to organize makes negotiating for equitable intellectual property policies even more difficult.

As a result of the graduate students' bargaining limitations, the university and its professors should consider the plight of graduate students when revising the policies. Such a suggestion may be fanciful, especially since it seems unlikely that faculty would advocate for greater rights for students than they currently receive. Considering that all professors once stood in the same position in which their students stand today, however, this suggestion may not be so whimsical. Professors can recognize some of the frustrations graduate students endure since they may have encountered the same difficulties when they were students.

Through design courses which integrate a student's education and ingenuity, students are challenged to find solutions to difficult problems: They may attempt to reduce sulfur dioxide emissions from coal-gasified power plants, optimize cooling modules for railroad electric motor controllers, or develop innovative engineering techniques to adapt cars for cold weather environments.¹³⁰ Inspired by the allure of realizing the potential of their designs, students spend many hours working on these projects. The traditional demands of homework assignments and exams, coupled with serious time constraints such as the intense design experience and teaching assignments, can make the student's life very stressful.¹³¹

129. See *supra* part IV.A.

130. See William K. Durfee, *Engineering Education Gets Real*, *TECH. REV.*, Feb. 1994, at 42 (publication of the Massachusetts Institute of Technology Alumni Association).

131. Stanford University Professor Paul Berg, who shared the 1980 Nobel Prize in Chemistry for fundamental research on genetic engineering, "fears that universities' new push to transfer technology puts pressure on academics to do work likely to yield practical results." Beardsley, *supra* note 7, at 92B. Professor Berg notes that "[y]oung people will be under pressure to do things that will bring income to the university." *Id.*

There is no evidence that universities and faculty recognize the existence of these new demands on students. In fact, graduate students often spend time investigating all conceivable avenues of a particular research topic in pursuit of their certification because universities recognize that these students comprise a constant supply of cheap teaching and research labor. In this sense, the student is at the mercy of the program. The university enjoys the economic rewards of the labor, while the advising professor may prosper through academic recognition in the scientific community. Students may feel some sort of satisfaction for simply having taken part in successful research projects. However, they undoubtedly feel that the years spent on the research are surely worth more than a feeling of satisfaction. Universities are simply "deriving the profit from all these bright, dedicated young people, then throwing them away like yesterday's newspaper because there are more coming."¹³² Faculty and universities must begin to realize these new problems when evaluating the current system¹³³ of ownership of student-generated intellectual property.

C. Individual Student Ownership & Management

Student ownership of intellectual property would not come without problems. The conflicts of interest, the financial support to administer patent protection, marketing, and the effect on traditional industry-university and government-university relationships are all areas of concern that could derail any attempt to allocate ownership rights to individuals. As long as a student's intellectual property is distributed in a manner consistent with university commitments, however, the student should encounter few problems in managing her intellectual property.

With individual ownership comes the responsibility of managing the property. This becomes rather costly and tests the student's ability to finance the process, which university technology transfer offices now handle.¹³⁴ These offices provide assistance in patent administration, product assessment, market evaluation, and licensing of products, with minimal financial return. The mere fact that now a student, instead of a university, owns the intellectual property rights should not affect the role of a technology transfer office. The cost of using the services the offices provide can be collected through the profits derived from licensing schemes in much the same way office personnel are currently funded.

After a product assessment and market evaluation, the technology transfer office could refuse to allocate its resources to those inventions and creations which it believes will not

132. Sharon Begley et al., *No Ph.D.s Need Apply*, NEWSWEEK, Nov. 5, 1994, at 63.

133. Worth mentioning, although beyond the scope of this Note, is the graduate student's lack of involvement in the revision procedures of most university intellectual property policies. For instance, at The Ohio State University, only one graduate student sits on the committee of eleven responsible for reviewing, recommending, and advising the university on matters relating to their policy, and serving as a board to which a researcher might appeal a dispute. THE OHIO STATE UNIVERSITY, *supra* note 106, at 3. At other universities, such as Indiana University, students play no role in the revision or appeals process. INDIANA UNIVERSITY, *Patent Procedure*, in STATEMENT OF PRINCIPLES ON INTELLECTUAL PROPERTY 4 (1994).

134. Technology transfer, when associated with research universities, means "the transfer of the results of basic and applied research to the design, development, production, and commercialization of new or improved products, services, or processes." MATKIN, *supra* note 8, at 5.

be worth its time and effort. A student who disagrees with the office's assessment would be free to solicit firms, agents, and brokers to market the invention. Universities may take a paternalistic view that students will render themselves vulnerable to unscrupulous brokers who will take advantage of the students. However, if the invention, based on the technology transfer office's assessment, is not exploitable, then students will not be vulnerable since there is nothing to exploit. If, on the other hand, there is the potential for financial gain through the exploitation of the invention, then the university technology transfer office should accept the duty to market the invention. The technology transfer office's involvement in the marketing process and its affiliation with the university will attract industry and other developers to invest their resources with the university's research teams. Under such a system, the university does not lose anything that it is legally entitled to, while the student retains the intellectual property rights and the accompanying financial benefits.

D. Student-University Joint Ownership

In general, inventors are those who create patentable subject matter.¹³⁵ A joint invention is the product of a collaboration of the inventive ventures of two or more individuals working toward the same end and producing patentable subject matter through their combined efforts.¹³⁶ The entire inventive concept need not occur to each, nor must each physically work on the project with the others or put forth a reciprocating effort.¹³⁷ Joint inventorship requires only some quantum of collaboration or connection between inventors.¹³⁸ However, simply carrying out procedures assigned by another or reducing an idea to practice is not enough to establish joint inventorship. Joint inventors of patentable subject matter become joint owners of the patent upon its issuance; therefore, each individually enjoys the limited monopoly rights, free of any duty to account for profits received, that accompany all patents.¹³⁹

The student collaborator who acts as one of a group of principal investigators in the development of a patentable invention and makes significant contributions to the final product may legally be entitled to all of the rights of co-ownership. A university's refusal to include the student in royalty and licensing revenue agreements may backfire. A graduate student who is a named inventor on a patent, or who fits the legal definition of an inventor under 35 U.S.C. § 116 is in a very powerful position that universities may fail to consider. In both of the scenarios, the student may refuse to assign his or her rights in

135. See *supra* note 28.

136. *Monsanto Co. v. Kamp*, 269 F. Supp. 818, 824 (D.D.C. 1967).

137. *Id.*

138. 35 U.S.C. § 116; *Kimberly-Clark Corp. v. Procter & Gamble Distrib. Co.*, 973 F.2d 911, 917 (Fed. Cir. 1992) (holding that the two individuals responsible for substantial improvements in leak-free disposable diapers could not be joint inventors since neither had knowledge of the other's contributions). Some form of communication and shared knowledge is all that is needed to satisfy the collaboration threshold. See Robert J. Lauson & Bruce A. Brunda, *Federal Court Decisions Attempt to Settle Joint Inventorship Questions*, NAT'L L.J., Oct. 31, 1994, at C15.

139. 35 U.S.C. § 262 (1988), amended by Pub. L. No. 103-465, §§ 533(b)(3), 534, 108 Stat. 4989, 4990 (1994) ("In the absence of any agreement to the contrary, each of the joint owners of a patent may make, use, offer to sell, or sell the patented invention within the United States, or import the patented invention into the United States, without the consent of and without accounting to the other owners."). Joint ownership of copyright, on the other hand, requires the owners to account to one another for any profits received. See, e.g., Reichman, *supra* note 99, at 84.

the patent and, thus, may be able to destroy the university's expected licensing agreements due to the unaccountability. Under no duty to account to the university as a co-owner, the student may be able to license the invention to a competitor of the university's licensee and undercut the university's licensing fee.¹⁴⁰ Thus, it is easy to see how a student could destroy the value of a license to a potential licensee of the university. These conflicts are further exacerbated when the joint inventors and co-owners of a patent do not share the same economic or long-range goals.¹⁴¹

Complications also arise when graduate students make significant contributions to copyrightable computer programs and software. Whether or not a student can claim joint authorship depends in part upon the amount of contribution the student makes to the copyrightable expression¹⁴² and, in part, upon the view that courts adopt regarding the intent to merge the contribution into the copyrightable work at the time of creation.¹⁴³ The contribution must be copyrightable expression, not just simply ideas.¹⁴⁴ The joint author of a copyrighted work automatically acquires an undivided interest in the entire work along with the power to license it. Joint authors of copyrighted works, unlike joint owners of a patent, must account to one another for profits received as a result of licensing the work.¹⁴⁵

When students and faculty join their inventive and creative efforts to compose a computer program, the students, as co-authors, become co-owners of the copyright and control its commercial exploitation. The faculty member may have assigned the rights in the copyright as part of the employment agreement; the nonemployee student, however,

140. As an alternative to competing with the university in securing licensing agreements, the student may simply disclose the invention to the public by timely publishing. See *supra* text accompanying note 99.

141. A discussion and analysis of co-ownership of patents is beyond the scope of this Note. However, the brief foregoing discussion illustrates not only some of the difficulties of student ownership of patents, but also the potential dangers of the current system when students are aware of their legal rights.

142. A respected scholar of copyright law suggests that an author need not make a copyrightable contribution to a work in order to be considered a joint author, since neither the Copyright Act of 1976 nor its legislative intent support or allude to any such requirement. 1 MELVILLE B. NIMMER & DAVID NIMMER, *NIMMER ON COPYRIGHT* § 6.07, at 6-24 to 6-25 (rev. ed. 1995). Professor Nimmer advocates a standard whereby the contribution needs to be more than de minimis. *Id.* at 6-23. This view is consistent with the constitutional purpose, engendering creative activity, since joint works could be created with greater ease. This is especially true in the area of computer software where a joint author often goes unrecognized due to the inseparable nature of the contributions and a subsequent finding of no creative contribution. See Scott C. Brophy, *Joint Authorship Under the Copyright Law*, 16 HASTINGS COMM. & ENT. L.J. 451, 472-73 (1994). Brophy writes:

If the purpose of copyright law is to create a balance between incentive to create and dissemination of information to promote learning, culture, and development, then giving joint author status to one who feeds ideas to another who creates expression will not thwart the purpose. After all, without the idea, it is quite possible the expression would never exist.

Id. (footnote omitted).

143. 17 U.S.C. § 101 (defining a joint work as one "prepared by two or more authors with the intention that their contributions be merged into inseparable or interdependent parts of a unitary whole"); *Childress v. Taylor*, 945 F.2d 500 (2d Cir. 1991) (standing for the proposition that there must be an intent, at the time of creation, to merge a work with another work to form a unitary whole). But see Nancy P. Spyke, *The Joint Work Dilemma: The Separately Copyrightable Contribution Requirement and Co-ownership Principles*, 40 J. COPYRIGHT SOC'Y U.S.A. 463 (1993) (finding that a consensus as to what constitutes intent does not exist). For a general analysis of the intent requirement of joint works and an analysis of recent decisions regarding the requirement, see Brophy, *supra* note 142.

144. But cf. *supra* note 142.

145. Interestingly, in the case of a computer program or software, portions of the work may be entitled to patent as well as copyright protection. In the case of a joint work, the authors/inventors would in some instances be under a duty to account under copyright law, and under no duty to account under patent law. One commentator notes that "the potential conflict between [patent law and copyright law] should not be underestimated." Reichman, *supra* note 99, at 84.

has not. The university finds itself in a difficult position.¹⁴⁶ In this situation courts have begun to consider a graduate student's contribution as an employee work for hire rather than as a joint work.¹⁴⁷ This is inconsistent simply because the student is not an employee.¹⁴⁸

CONCLUSION

The Founders believed that creativity and innovation could be fostered best when individuals are motivated to work and are compensated for the fruits of their labor based on their productivity. This canon has not disappeared over the past two hundred years. The inventive process has become the most significant factor in economic growth.¹⁴⁹ The trend in university intellectual property policies to reward faculty for their creations shows that universities recognize the correlation between the motivation to work, the compensation, and economic growth. Due to students' nonemployee status and their inability to organize a force that can act to negotiate equitable ownership policies, faculty and university administrators need to consider the inequities students face today. Although the move to a more student-friendly policy will raise new issues, such issues should not discourage universities from changing. Having already adopted more faculty-friendly policies, universities have the ability to manage the change.

The legal right of an inventor in his or her invention should not be seen as a threat to the financial structure of university research. Ultimately, the university is an institution of higher learning and the rewards of fruitful research should be seen as an incidental effect, not a long-term result. Recognizing a student's legal right in his or her creation encourages the student to set higher goals.

Today's graduate students play a vital role in the overall framework of research and development in the United States. There is no justifiable reason why graduate students should not be recognized with ownership interests in their intellectual property. Such recognition will provide students with favorable impressions of their universities. Ultimately, these students, in their capacity as industry researchers, can act as key links in the distribution of future research grants, thereby providing universities with a consistent source of funds.

146. University joint ownership with a student could inhibit the university's efforts to transfer the intellectual property to industry and compromise a university's ability to profit from any intellectual property rights it solely owns. In the case of a computer program, the commercial value of which stems from the improvements made on the original university-generated program, the exclusive right to create derivative works is vital to an effective licensing agreement with industry. *Id.* at 88 (stating that "the university's true capacity to commercialize a computer program might depend partly on its acquisition of the faculty authors' adaptation rights and partly on its ability to limit the number of nonfaculty owners of copyright").

147. *Childress*, 945 F.2d at 507 (describing a research assistant's contribution in the form of "some protectable expression or merely a sufficiently original selection of factual material as would be entitled to a copyright, yet not be entitled to be regarded as a joint author of a work in which the contributed material appears"); see also Reichman, *supra* note 99, at 85 n.172 (noting that "[s]uch a contribution need not be a work made for hire if, for example, it exceeds the scope of any employment agreement that may be in force"). This view, however, is inapplicable in the case of graduate students, since they are not employees.

148. Issues regarding co-ownership in copyrights, as in patents, are introduced merely to show an example of one difficulty that a move toward a more student-friendly university intellectual property policy will encounter.

149. Baker & Brunel, *supra* note 65, at 403.