Engaging First Year Students with Intellectual Property

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Abstract

Since intellectual property is so important to engineers, creating enthusiasm from the beginning of their engineering studies is imperative. Since first year students have not learned how to apply technological concepts to real life, demonstrating intellectual property could be a challenge. To engage first year engineering students in the concept and the value of intellectual property, students were introduced to basic concepts and applications. Different concepts were applied to real life examples allowing them to interface with technology from an intellectual property perspective. This paper highlights not only patents, but also trademarks and trade secrets.

1. Introduction

Intellectual Property is important to future engineers because they will not only be the Creators, Designers, and Developers of Intellectual Property, but also the Managers and Users of Intellectual Property. Not only will they need to conceptualize what intellectual property is, but they will need to become familiar with their rights in regard to intellectual property. In fact, in their future careers, engineers may be confronted with contracts that have intellectual property specific agreements. For example, a company may want to retain intellectual property rights and require an engineer to sign over the intellectual property rights of their discoveries and inventions. Additionally, future engineers need to be aware that when they sign a Non-Disclosure Agreement, those Trade Secrets should not be shared. With intellectual property knowledge, the engineer will know how to protect both their own work and the property of their future employers. Intellectual property is often developed within a large plan or development. A discovery or invention may be broken into several parts, improved on over time, hidden by use of trade secrets, or marketed by means of trademarks.

Engineering instructors include instruction about patents in their classes, but said instruction is often limited to upper level classes [1,2,3,4] or held across multiple sessions [1,2,3,4,5,6,7]. (In the current case, the lecture was limited to 50 minutes and delivered to first year students with little technical knowledge.) One can, however, glean some teaching principles from these authors. Van Treuren, Jean, and Fry [7] view teaching patents as a method “to introduce students to the role of patents in the day to day life of an engineer and to give them an appreciation for economic value of the intellectual property produced by engineers.” Petroski [8] presented patents to illustrate the design process. He presented students with paper clip patents from the twentieth century and had them redesign the paper clip and write a technical report about the process. Although this involved presenting patents in an interactive manner, it required several sessions. Like Petroski, Brown [5] used a simple design—barbed wire—in order to convey the complexities of inventions and patents. During Brown’s two to three hour workshop he demonstrated the need for prior art and introduced patent searching. He drew his students in by having them design barbed wire using pipe cleaners. Because of the simple design of the invention, it was easy for all students to understand, even without a technical background. Schaefer and Panchal [4] advocate using patents as a method to engage students in ‘deep learning.’ So, it is useful to draw students in by (1) introducing the role of patent in day to day life; (2) using simple design to convey complexities; (3) using patents to engage students in ‘deep learning.’ According to Bentz [9], ‘deep learning’ is “at once emotional and intellectual,
mental and physical, social and personal, totally unique yet freely shared.” While ‘deep learning’ utilizing balance, inclusion, and connection [10] can be the ideal, on the practical level, active learning was employed in this session.

Garris [1] outlines four propositions for integrating patents into the undergraduate curriculum. These include 1) “Optimal Design is an Integrative Process,” 2) “Ethics of Design in Competitive Industry are Intricate,” 3) “Innovation in a Litigatious Environment can be Dangerous,” and 4) “Patent Rights are Valuable Assets.”

From this prior art we see that in order to draw students into the complexity of intellectual property we should use three principles: 1) introduce the importance of intellectual property in the daily life of the engineer; 2) use simple design to convey complexities of the patent system; 3) use patents to engage students in active learning (instead of the idealized ‘deep learning’). Teaching intellectual property (following Garris’ [1] suggestions) should convey, A) “Optimal Design is an Integrative Process,” B) “Ethics of Design in Competitive Industry are Intricate,” C) “Innovation in a Litigatious Environment can be Dangerous,” and D) “Patent Rights are Valuable Assets.” I add here, E) Patents are a part of a portfolio of intellectual property rights. These five themes are summarized in Table 1.

<table>
<thead>
<tr>
<th>Corresponding Letter</th>
<th>Theme</th>
<th>Covered in Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Optimal Design is an Integrative Process</td>
<td>3, 4, 5, 6, 7</td>
</tr>
<tr>
<td>B</td>
<td>Ethics of Design in Competitive Industry are Intricate</td>
<td>4, 6</td>
</tr>
<tr>
<td>C</td>
<td>Innovation in a Litigatious Environment can be Dangerous</td>
<td>5, 7</td>
</tr>
<tr>
<td>D</td>
<td>Patent Rights are Valuable Assets</td>
<td>1, 7</td>
</tr>
<tr>
<td>E</td>
<td>Patents are a part of a portfolio of intellectual property rights</td>
<td>1, 2, 3, 4, 5, 7</td>
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2. Methodology

At the beginning of the lecture, the importance of intellectual property in the daily life of the engineer along with the introduction of intellectual property. This principle was further advanced with the example of WD-40 which most engineering students probably have used but not thought about the intellectual property complexity. This example begins to pique their interest. As they delve into the examples and physically touch the inventions, the students are drawn into deep learning and thought about the complexity of intellectual property.

Simple examples were then introduced to convey various aspects of intellectual property learning. The previous studies only covered patents but this lecture covered not only patents but
also trademarks and trade secrets, because products should be designed with consideration of not only the invention, but also its marketability using trademarks, and deciding what should be held back as a trade secret.

Since freshmen engineers have little technical experience, diving into disclosures or even patent classifications would be challenging for them. A lecture which strictly presents intellectual property as a theory would not necessarily convey a deep understanding of patents. Instead, finding inventions that tie into a simple understanding of the world around them and examples that illustrate concepts of product development enables the students to understand underlying principles of product design and development. In order to cultivate students’ engagement in the subject, active learning techniques are used. McKeachie [11] defines active learning: “We assume that the more a student is meaningfully engaged in the task, the more she or he will learn. Our conceptualization of student involvement in self-regulated learning assumes that the student is an active learner. Self-regulated leaning is a combination of cognitive and metacognitive involvement with a task as well as motivated involvement with a task.” Additionally, Bonwell and Eisen [12] propose this definition of active learning: “active learning be defined as anything that involves students in doing things and thinking about the things they are doing." Prince [13] further defines active learning “as any instructional method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they are doing.”

Active learning must be preceded by the introduction of basic concepts which can then be incorporated into the active learning. Therefore, this active learning activity about intellectual property was proceeded by a lecture introducing intellectual property within the context of an engineer’s utilization of and creation of it. The active learning was set up in a way to convey not only the basic concepts of intellectual property but also the methods by which the inventions could be applied to product design, as well as introducing industrial niches. Inventions were chosen that could be easily understood.

2.1. Review of Intellectual Property Example

A lecture introducing and conceptualizing intellectual property was followed by a brief in-class exercise testing the students’ knowledge. Trademarks of a well-known product were shown and the students were asked to define what the pictures represented; namely, trademarks of WD-40. Then a disclaimer from the WD-40 website was shown, discussing what was not in the product; this demonstrated a trade secret (as the formula WD-40 is a trade secret.) Finally, a design patent was shown and a can of WD-40 with its EZ-Reach® patented design was passed around the classroom.
Review of IP

Figure 1. Review of IP using trademarks, trade secret, and patent.
The following exercises involved showing selected images on the screen and passing around patent and trademark documents as well as the actual inventions.

2.2. Example 1: Cotton Candy Grapes

The beginning example was of a plant patent. A discussion about how plants and fruit could be patented ensued. The patent for Cotton Candy grapes was shown. It is notable that the name “cotton candy” does not display on the patent. Since, after 20 years, anyone could grow these grapes, how could they be protected? (Many producers now grow the “Honeyscrisp” apple because its patent has expired.) To address this problem, inventors have now begun trademarking the names of their new plants. Then, the trademark for “Cotton Candy” grapes was introduced. How long does that trademark last? Indefinitely, as long as the trademark is renewed. This example conveyed principles D and E.

![Cotton Candy Grapes](image)

Figure 2. Cotton Candy Grape patent and trademark. US PP23, 399 and Reg.1436702.
2.3. Example 2: WD-40

The next example was again of WD-40. This time the students were shown several trademark documents as well as a copy of the design patent, as an actual can of WD-40 with the design was passed around. This conveyed principle E.

Figure 3. WD40 Trademarks and patent. Reg.4417715, 5609944, Patent US D723,368.
2.4. Example 3: Solar Lights--Katsaros

The next example was of a solar light by the inventor Katsaros and the company Nokero. It was discussed how this inventor intended his patent for areas in Africa where households seldom had electricity for lights in the evening. The invention was passed around with the trademark and various patents for different designs. This was followed by a short discussion about the evolution of invention designs. This example conveyed principles A and E.

Solar Lights—Katsaros--Nokero

2.5. Example 4: Solar Lights—Alice Chun

The next example was of a solar light designed by Alice Chun called Solight. A model of the light was passed around with the trademark and patents. Her development and marketing of her product was also discussed. Her product was developed to send to areas who had had their electricity disrupted through natural disasters. The collapsibility allowed for many to be shipped in a small container. Additionally, the air inside the box, once expanded, would allow the light to float. Her invention was contrasted with the previous example. It was discussed how products could exist within the same segment and how trademarks help distinguish similar goods from others. Principles A, B, and E were highlighted.

![Solar Lights—Alice Chun: Solight](https://solight-design.com/)

2.6. Example 5: Freshpaper

The next example was of Freshpaper developed by Kavita Shukla (who was inspired by her grandmother). It was discussed how although the idea came from her grandmother, the inventor had to work for years to develop just the right paper. She also registered her trademark to prevent counterfeits. However, if one searches Amazon.com one can find her product as well as counterfeits. The invention as well as the patent and trademark were distributed. This example conveys principles A, C, and E.

Freshpaper: Skukla

https://www.freshglowco.com/

2.7. Example 6: Coffee Cup Holders

The next example was of cup holders for coffee. Cupholders were passed around. Most students were familiar with Panera or Starbucks coffee holders. The first patent for the Panera coffee holder was passed around. Then, noting that the Starbucks’ cupholder had a different patent number printed on it, a second patent was passed around. That second patent was discussed as it covered not the holder itself but the technology for mass producing cupholders. This example conveyed principles A and B.

![Coffee Cup Holders](image)

Figure 7. Coffee Cup Holders. Patents, US 5,425,497, US 6,863,644.

2.8. Example 7: Brochure for Apple v. Samsung Decision

The final example was a brochure that had been created for the Apple v. Samsung decision. This brochure allowed us to have a discussion about not only iPhone patents but also of the strategy behind developing a technology. It is obvious from the patents in the decision that many different patents went into the iPhone: the shape, the design, the software, the arrangement of icons (and many more not in the litigation). This example conveyed principles A, C, D, and E. Notably missing was B, because Samsung was found to have copied rather than creating a design-around.
3. Conclusion

Students can be engaged with intellectual property and the ideas of patents, trademarks, and trade secrets. If the examples begin with a simple design that ties into day to day life, students can realize the economic value of intellectual property. Core principles can be conveyed to students using these building blocks.
References


