

A Study on the Development of Intellectual Property Education Course Focused on Entrepreneurship

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Abstract

This study proposes a model of entrepreneurial-based intellectual property education that enables practical learning through appreciating convergence of intellectual property education, patent application in engineering and business administration. To verify the education model, the demonstration program proceeded as a regular course for the first semester in university. As a result, the students' satisfaction and learning performance were very high. In this paper, it provides various implication for the new direction of intellectual property by suggesting education based on practice.

Keywords: Intellectual property, Startup, University, Education, Convergence

1. Introduction

In the era of the 4th industrial revolution, there has been a decline in the number of jobs required for human intervention, evolving into a 'Data-Based Automation' stage. As a result, the social demand for professional manpower has increased in the industry. Especially in the knowledge-based economic society, even though it is essential to nurture and train intellectual property specialists, we are short of supplying professional manpower [1]. Also, since the growth of enterprise has become more difficult to create jobs, the establishment of a startup ecosystem has become a more important task [2]. As the creation, protection and utilization of intellectual property play an essential role in start-up, entrepreneurship and intellectual property education are very closely related. In particular, the current government emphasized strengthening creative and convergent education to proceed to 'Person-Centered Economy'. Thus it is necessary to cultivate professional manpower and invigorate the entrepreneurial ecosystem through creative and convergent education. To examine the necessity of intellectual property education curriculum based on entrepreneurship, this study first examines the current status and limitation of intellectual property education and entrepreneurship education. From this analysis, this study proposes intellectual property curriculum focused on entrepreneurship based on the advanced education model.

2. Intellectual Property and Entrepreneurship Education

In a society based on advanced ICT technology, demand and specialty of professional manpower in intellectual property are required. Since only law-centered education is being taught in the university, various discussions are being made to improve the education model. In 2008, 'The 1st National Intellectual Property Profession Manpower Development

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Plan(2008~2012)' was established and continually 'The 2nd National Intellectual Property Manpower Development Plan(2013~2017)' was proceeded in 2013. In the case of the 1st comprehensive plan, it was promoted based on the cultivation of intellectual property manpower through the development and operation of the intellectual property education course. As a result, the necessity of intellectual property education was recognized. However, the systematicity, autonomy, and diversity of education were insufficient and also there was a lack of field specialists and international experts [3]. To overcome these problems, the 2nd plan was proceeded to expand the basic education of intellectual property, considering that the education of intellectual property in science and engineering universities was short of professional manpower in the R&D field.

The purpose of entrepreneurship education is to provide knowledge and information related to entrepreneurship to prep entrepreneurs by enhancing entrepreneurship ability and encourage entrepreneurial spirit to improve the success rate of entrepreneurship. Also in Korea, entrepreneurship education is based on enhancing entrepreneurial spirit [4]. In particular, the reason why entrepreneurship education and entrepreneurial spirit are spreading globally is that entrepreneurship education affects an individual's attitude or behavior toward entrepreneurship [5]. Recently intellectual property and entrepreneurship education have been invigorated in domestic four-year universities and colleges. Since the mid-2000s, the Ministry of SMEs and Startups (MSS) has been supporting the leading startup universities and start-up graduate schools, and the Ministry of Education installed a startup support foundation and startup education center for entrepreneurship education through Leaders in Industry-university Cooperation (LINC) project [6]. Therefore, the university has started entrepreneurship education such as establishing an entrepreneurship education curriculum and entrepreneurship club. Also provides various programs such as start-up competitions, patent expense support, and start-up camps. In addition, the government provides all-around support such as expanding financial support for startups to nurture creative human resources and establish high-quality entrepreneurial ecosystems.

These various efforts have made startup education in universities very active. In 2017, the number of universities that introduced startup-friendly bachelor's degree programs such as startup leave system and startup scholarship system has increased compared to previous years, according to the university startup statistics survey. In addition, the number of entrepreneurship classes doubled from the previous year and at the same time, the number of entrepreneurship clubs has also increased by about 25% [7].

3. Entrepreneurship centered intellectual property education design

This study developed a training module that enables students of various majors to experience the entire life-cycle of intellectual property, focusing on content that is relatively high in importance and demanded by students. Based on the existing intellectual property education contents, it is classified into IP discovery module, IP privatization module, and IP commercialization module. The IP discovery module is a basic concept learning and discovering idea stage such as idea contest. The IP privatization module is the analysis stage which contains intellectual property contests, intellectual property applications and registration. The IP commercialization module includes technical commercialization and technical value evaluation which includes entrepreneurial spirit and commercialization plan.

Overall, it is composed of content with the theory-information-practice phase and able to meet various learning objectives of students. To strengthen basic learning capabilities, it is necessary to include technology and business administration related to entrepreneurship. It also

runs a variety of support programs such as contests, field trips and experience programs. After the basic module education, an advanced module that aims to educate students' interest and career correspondence by establishing infrastructure for training human resources in each field. The advanced module is developed as a liberal arts form and operates an internship program with related organizations to enhance practical experience. In addition, problem-based and case-based lectures will link to external projects and intensive training programs. In other words, learners can find out the specific field that is suitable for themselves from the life cycle of the intellectual property. Also, it is possible to increase the linking with the entrepreneurial subject in the future.

Table 1. Basic curriculum

Standard module		Main Content
IP Excavation module	Idea	Brainstorming / Lighting, Triz, Design Thinking, Benchmarking
	Design Thinking	Design Thinking Concept, Methodology, TOC Thinking Process, etc.
	Creative Engineering Design (TRIZ)	TRIZ concept, system thinking, contradiction analysis, separation principle, etc.
	Policy for finding ideas	Domestic and overseas support project status, idea commercialization policy, etc.
	Excavation project	Idea Competition
IP Righting module	Information search and analysis	Research on prior patents, research on patent information, etc.
	Understanding patent specifications and drawings	Construction of specifications, features of drawings, designing and designing specifications
	Intellectual Property Application and Registration	Online offline procedure and related form writing method
	Right to Support Policy	Domestic and foreign rights support projects and participation methods
	Rights Project	IP Tone (Specification Contest)
	Technology commercialization	Entrepreneurial spirit, commercialization plan, BM development, etc.
IP Commercialization module	Technical valuation	Type and method of valuation, feasibility analysis
	IP Licensing and Dispute Resolution	Licensing strategies, conflict resolution strategies, etc.
	Technology Commercialization Finance	Policy funds, investment attraction, corporate value evaluation, etc.
	Project for commercialization	Conspire IR Competition

4. Curriculum verification

4.1. Demonstration of curriculum

To verify the model, Dankook University opened a liberal arts curriculum for interdisciplinary education that operates based on the project to balance theory and practice. As

a demonstration curriculum, a total of 12 students enrolled in the second semester of 2017. It consists of 11 teams to enhance and personalize their ideas. Students were divided into general students (those who did not take entrepreneurship education) and students who participated in entrepreneurship club (entrepreneurship education group). Each student developed an idea and write an invention report.

The students who participated in the entrepreneurship club suggested ideas that could be materialized and designed compared to the general students. In the demonstration lecture, there was a difference between the group that did not take entrepreneurial education and the group that took entrepreneurial education. In general students, many similar ideas were related to problems in everyday life, but most of the ideas were difficult to commercialize. In addition, students had many difficulties in understanding the process of granting ideas.

For example, there is an idea of ‘IoT door knocker’ by the general student. This comes from the idea that the user can get weather information from a smartphone to take an umbrella when opening the door. Users will be informed by the Arduino ultrasonic distance sensor from IoT based entrance door when approaching, and the smartphone will provide weather information. Therefore, on a rainy day, a certain signal is transmitted through Bluetooth and the LED will be lilted.

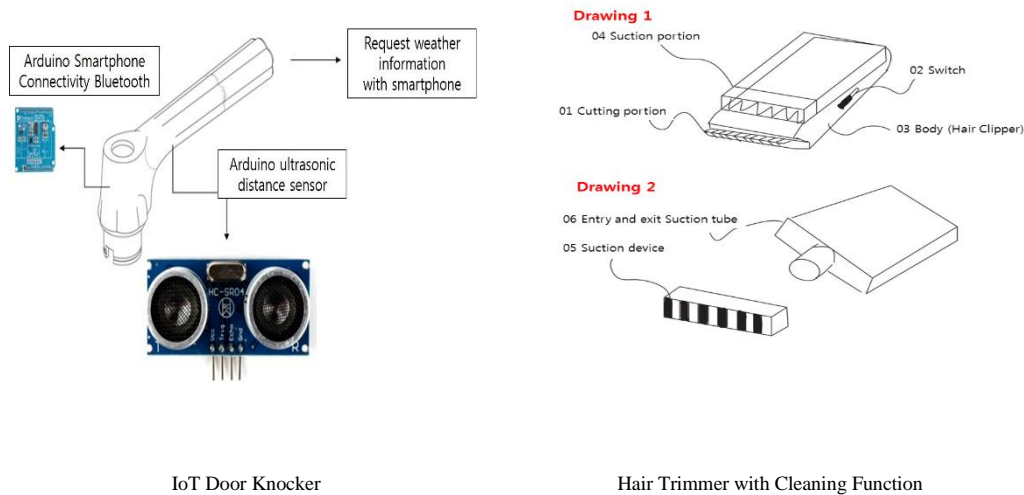


Figure 1. Ideas of normal students

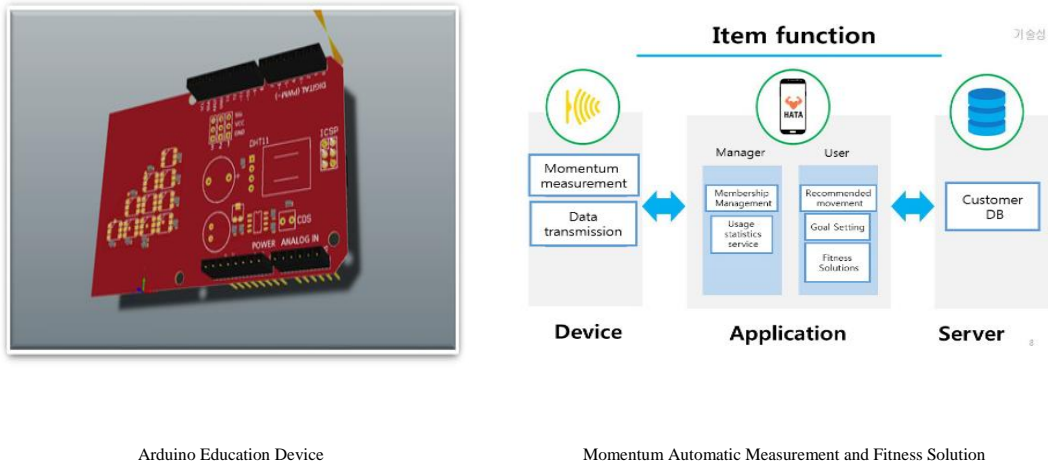
The second idea, ‘Hair Trimmer with Cleaning Function’, is to remove hair debris when using a conventional clipper to cut hair, and to prevent the user from feeling uncomfortable with residue. The idea was to find a useful way to clean the hair residue and led to inventing a clipper with a micro-injector.

Lastly, the ‘Half-gloved Presenter’ is related to a half-size glove presenter in which each operation button of the presenter is implemented in each part of the glove so that the operation buttons of the presenter can be easily recognized when the presentation is performed. The operation buttons on the glove can control the presentation slide and laser beam so that multi-functional presentation can be easily operated in natural behavior. While it is advantageous to keep the concentration from being distributed to other elements however there is a limit of similar objects like a wireless presenter.

For students participating in the entrepreneurial club, the ideas of ‘Arduino Education Device’ and ‘Momentum Automatic Measurement and Fitness Solution’ are mentioned. The ‘Arduino Educational Device’ idea to simplify the device with built-in sensors or actuators that

able software coding without a circuit connection since the existing Arduino board required purchasing parts and connecting circuits to use the sensor.

In the case of ‘Momentum Automatic Measurement and Fitness Solution’, users can not only receive their momentum in real-time but also provide custom fitness solutions through the data. It is a user-customized exercise management system that measures the amount of exercise per user based on the data.



Arduino Education Device

Momentum Automatic Measurement and Fitness Solution

Figure 2. Ideas of startup clubs

According to the overall evaluation of the lecturers, the level of students was relatively high, efficient, and active. However, there was a difference in educational attainment between general students and students participating in entrepreneurship clubs. From the comparison of competence elements that differ from general students, such as program participation, idea level, originality, willingness to pursue privatization. In the case of the group that took entrepreneurship education, the idea of an innovative idea and creative design was made rather than those who did not. In other words, it can promote IP privatization and IP commercialization to the group that took entrepreneurship education. In addition, entrepreneurial enthusiasm for entrepreneurship education and originality of ideas were higher, which could confirm the importance of entrepreneurial education in improving students’ perception of intellectual property. As a result, students who have experienced practical training courses showed more interest in entrepreneurial intentions and made a lot of efforts in various knowledge and skills related to entrepreneurship, and have proved to be more confident [8].

5. Conclusion

This study suggests a curriculum that is an entrepreneurial-centered intellectual property education program to complement the limitations of the existing intellectual property education program and it is meaningful to confirm the possibility of the education model. Through the demonstration, students were highly satisfied with strengthening the human network and practical lecture method. In addition, the group that took entrepreneurship education showed higher achievement in identifying and commercializing the idea than the general students. However, there was a lack of time to explain more easily about intellectual property

privatization, and there was a problem of overlapping contents of lectures by experts. In addition, a parallel of theory-based lecture and practice-based lecture made an insufficient amount of time to discuss. In other words, the necessity of divide theory type and practice type lecture was raised.

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