Intellectual Property Education as a Means to Nurturing Creativity

Japan Patent Office
Asia-Pacific Industrial Property Center, JIII

CONTENTS

Page

0. Preface – The Importance of Intellectual Property Education ····· 1

1. Shigeyoshi Matsumae and the Non-Loaded Cable ····· 3
1-1 Invention of the Non-Loaded Cable and Its Implications ····· 3
1-2 Tokai University's Modern Civilization Theory ····· 5
1-3 History of Denmark and Importance of Science and Technology ····· 6

2. What is Tokai University's Model of Intellectual Property Education? ····· 9
2-1 Importance of Intellectual Property in Japan ····· 9
2-2 Intellectual Creation Cycle: Creation, Protection, Utilization ····· 11
2-3 Implementation of an Intellectual Property Education Program in the Elementary and Junior High School Curriculum ····· 13
2-4 Implications from Developmental Psychology ····· 14
2-5 Intellectual Property Education in Practice ····· 17
2-5-1 Sample Cases for Nurseries, Elementary Schools, and Junior High Schools ····· 17
2-5-2 Sample Cases for High Schools ····· 18
2-5-3 The "Intellectual Property Olympic Games" ····· 20
2-5-4 Sample Cases for University ····· 24
2-6 Characteristics of Tokai University's Intellectual Property Education ····· 25
2-7 Introducing Intellectual Property Education ····· 27

3. To Build a Sustainable Society ····· 29
3-1 Conventional Environmental Education ····· 29
3-2 Application of the Environmental Education Approach ····· 29
3-3 Sustainability and the Intellectual Property Legal System ····· 30

4. Postscript ····· 31

Appendix 1 Teachers Guide to Intellectual Property Education ····· 34
Appendix 1-1 Nurseries ····· 34
Appendix 1-2 Elementary School ····· 36
Appendix 1-3 Junior High School ····· 42
Appendix 1-4 High School ····· 45
Appendix 1-5 University ····· 50

0. Preface

– The Importance of Intellectual Property Education

Over the years, Tokai University has directed many of its available resources into intellectual property education, in recognition of its indispensability in the coming era. This paper discusses the importance of intellectual property education, including its background and future prospects.

Tokai University is a forerunner in conducting collaborative projects between industry and academia among the public and private universities inside Japan, being aware of the importance of ensuring that academic activities are interconnected with society. How a university feeds its knowledge to society, and what kind of social contribution a university can make—this has been our long-term question and we continue to seek answers to it. In an industry-academia collaborative project, it is important to identify the separate roles of industry and academia and effective ways for them to inter-relate with each other. In particular, the existence of a project manager, who is a specialist in liaising and implementing this type of inter-organizational relationship, is critical. In today's understanding, how successfully the knowledge gained through academic research can be utilized in the industrial domain, or how the knowledge production system established in a university can be utilized in industrial problem-solving relies upon the project manager's competence. Tokai University has been researching how we can cultivate the talents necessary for this type of project management, such as creativity, expertise, and understanding of intellectual property issues, which are required in the process of transferring academic knowledge into industrial applications. We are particularly interested in this in terms of an individual's development stages. Such research has identified that the key to cultivating such talents lies in the early education, such as in the phase of preschool to elementary school, rather than the higher stage such as junior-high or high school. In particular, it has been found that creativity requires this early-stage intervention to be developed effectively, and it is now gradually being understood that this creativity is almost the core competence of business entrepreneurs, who are the major implementers of intellectual property.

It is natural that a project manager who is responsible for liaising between industry and

academia should be expected to possess a broad knowledge of intellectual property, including its role and importance to society. At the same time, if education that aims to cultivate creativity, which is the foundation for nurturing knowledge of intellectual property, has a nature that requires early implementation, the cultivation of creativity must have implications for the wider population. We have realized that this intellectual property education is meaningful not only to create future project managers and other intellectual property specialists, but also for ordinary people who may become involved in such issues. This is true especially in a time when the significance of intellectual property to society is growing, and education focused on intellectual property is becoming increasingly important.

We are confident that our understanding concerning intellectual property education, which we have gained after much trial and error, is indispensable to our future society. We even believe that this will be an important part of education to cultivate the human resources required by society in the coming age, in which global competence and awareness of sustainability are essential.

Tokai University has a history of links with intellectual property issues since its foundation. Our founding spirit also has shared a viewpoint with the intellectual property system. This paper aims to describe the various aspects of intellectual property education and demonstrate its importance and future roles, which will concern many people, including specialists in the field.

1. Shigeyoshi Matsumae and the Non-Loaded Cable

1-1 Invention of the Non-Loaded Cable and Its Implications

The founder of Tokai University, Dr. Shigeyoshi Matsumae (1901–1991), graduated from the Engineering Department of Tohoku University and joined the Ministry of Communications, as it was known at the time. He invented the Long-Distance Non-Loaded Cable Carrier Communication System and other technologies, which until recently have been used in long-distance telephony systems. The means of long-distance communication of that time was the telegraph, and messages were sent through a series of long and short signals. The telephone system uses audio signals composed of different frequencies, and these signals can become attenuated over long-distance communications, making long-distance communications difficult. At that time, Professor M. Pupin of Columbia University introduced long-distance telephone technology that reduced the attenuation of signals by inserting coils (known as “loading coils”) at regular intervals along the length of the telephone line. This equipment was widely adopted as an internationally standard technology.

Matsumae then became interested in the application of this loading coil technology, as his doctoral research concerned a vacuum tube called a “triode” that could amplify electronic signals. Matsumae’s other great interest concerned the future of Japan. Most of the scientific technologies of the day were imported from overseas and the usage of such technologies in production systems involved costly royalty charges. Due to its lack of natural resources, Japan was already highly dependent on other countries, and if Japan allowed itself to become dependent on foreign countries for its technologies as well, its future would be unpromising. This was Matsumae’s real concern.

Matsumae pointed out a fundamental problem with Pupin’s technology, which is that telephony signals deteriorate as they travel over long distances, because the different frequencies that compose the signals have different transmission speeds and therefore arrive at their destination at different times. He then suggested a non-loaded cable transmission method that eliminated the need for loading coils positioned over the cables, as well as introducing a multiplexing technique that enabled the transmission of multiple signals through a paired cable.

In his design, signal attenuation was addressed by siting amplifiers over the cables. Matsumae's method enabled communications over much longer distances than could be achieved by Dr. Pupin's system.

Establishment of a long-distance communication telephone system was not the only aim of Matsumae's research group in the Ministry of Communications. A further aim was to support Japan's independence by developing Japan's own technologies, and another was to contribute to building a peaceful society grounded on mutual understanding, which could be achieved through cross-border communications by a large number of people using the long-distance telephone system. The ministry began studying overseas patents in order to establish Japan's original technologies. Excluding those that did not offer sufficient novelty or innovation, they gradually built up Japan's own standards through collaborations between public and private bodies, and successfully established original Japanese technologies that did not depend on existing overseas' property rights.

The non-loaded cable technology did not simply mean the removal of loading coils from long-distance communication cables. It offered a completely different structure of cable that comprised a variety of patents, such as technology to prevent signal interference when more than one cable is bundled together, and the multiplexing of multiple signals transmitted through a paired cable. This technology became a standard that was used throughout the world until the recent development of digital transmission methods, and is counted as one of the ten most important Japanese inventions. Indeed, this could be said to be the real foundation of today's Japan, which is established on science and technology.

Japan at that time was in conflict with several countries, which eventually led to Japan's involvement in World War II. It is true that long-distance technology played a significant role in the invasion of the continent by the army of the day. In fact, this was one of the reasons that the government supported development of long-distance communication technology. However, Matsumae voiced objections to the war based on his objective analysis of Japan's international position, but this only led him to be sent as a second class private to the southern front line—despite his important post in the Ministry of Communications.



1-2 Tokai University's Modern Civilization Theory

Matsumae established a private school called Boseigaku Juku with the Asano Scholarship that he was granted for his non-loaded cable from the Institute of Electrical Engineers of Japan. Various important discussions were held in the school, including those concerning the future of Japan and the role of science and technology. Around 1925, Matsumae joined a Bible study group lead by Kanzo Uchimura, and he learned about Denmark's recovery from the war against Prussia supported by higher education. This caused Matsumae to determine to be involved in educational activities. Following his return to Japan after surviving the war, Matsumae founded Tokai University—the last university to be established under the former university law—in order to educate the technicians who could help to bear the future of Japan.

Matsumae was concerned that officialdom and the politicians who were responsible for deciding the future of the country, lacked an understanding of the importance of science and technology. At the same time, he also believed that engineers lacked a social perspective that was wide enough to take an initiative in leading the country. Because of these concerns, Matsumae aimed at a cross-fertilized educational system that would cover both the arts and the sciences. Through this approach, he believed that arts' students could learn the importance of science, and science and technology students could cultivate an understanding of history and society. He subsequently established high schools, junior high schools, an elementary school,

and nurseries under Tokai University, as he believed in the importance of providing a foundational education to young people, especially to teenagers.

To transmit this spirit of our foundation, Tokai University and its high schools have a mandatory class called “Modern Civilization Theory.” This class introduces the history of Denmark, with discussions about recognizing the importance of science and technology and its influence on society, nurturing an understanding of history, and a practical view of the international situation. The class is also designed to encourage students to develop their own perspectives. This is achieved by encouraging students to think about the future, in which they will participate, after learning that an understanding of the law of nature in one era influences the fundamental sense of values in the subsequent generation. The aim is to help students find their positions where they can contribute to society by enabling them to see the era that they are living in as part of a long stream of time, rather than just as a segment that exists here as an accumulation of the past. In this way they can get a picture of the future in which they will live. The following four-line verse captures the spirit of our foundation, and emphasizes the intention of the class.

Cultivate your thoughts in your youth;
Cultivate your body in your youth;
Cultivate your intelligence in your youth;
Direct your hopes towards the stars in your youth.

Although Tokai University is a general university, the number of science and technology students is dominant. This indicates that the university steadily follows the founder’s intention to cultivate human resources who are able to help build the future.

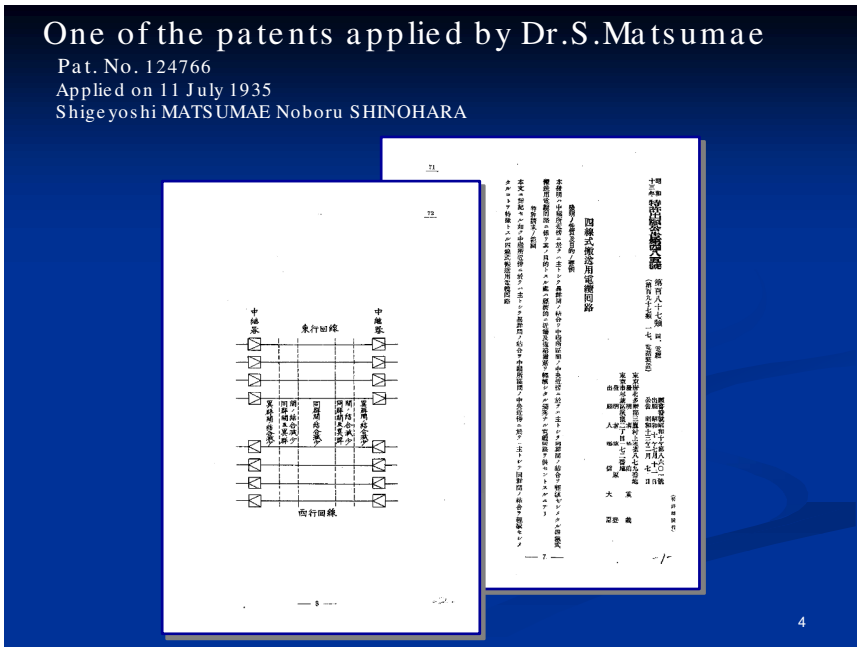
1-3 History of Denmark and Importance of Science and Technology

People learned a lot from the history of Denmark's restoration after the war in the Bible study group led by Kanzo Uchimura. In the late 19th century, Denmark lost much of its fertile land (now an area of northern Germany) after two wars against Prussia (modern day Germany).

What was left to Denmark was mainly Jutland, and a desolated society where many people had lost hope. In this difficult time, N. S. Grundtvig suggested the importance of youth education and C. Kold implemented his idea through the education in “folk high schools” using regional languages. In this way, the national restoration of Denmark came to be achieved. Education in the folk high schools provided young people with a multifaceted perspective that went beyond art and science, and a knowledge closely connected to the real world, together with a vision of the future. Thus, the schools produced human resources with a will to challenge something new. Matsumae empathized with this history, and dedicated himself to education, believing that human resources and the knowledge they could create would become the national property of the following generation of Japan, a land where natural resources are scarce.

When we think about the current state of countries around the world, including Japan, and the role of intellectual property in each country, we can realize just how important and indispensable intellectual property is to society now and perhaps more so in the future. In this context, Tokai University’s visionary activities, such as providing intellectual property education and organizing collaborative projects between industry and academia focusing on intellectual property, represents our unchanging efforts.

For Japan, being without many natural resources, human resources are its essential asset. When people nurture creativity and apply their creations to society, a country can maintain its presence in the international market, leading to its further development. This has been the teaching of Tokai University. Matsumae went on to extend his concept of communications, first developed around the non-loaded cable into Japan’s first FM broadcasting system, which was then used for educational programs. He also contributed to the establishment of the Atomic Energy Basic Act, which specifies the peaceful usage of nuclear power. Matsumae also attempted to keep up active communications with East European countries during the Cold War to maintain peace in the world.



A Part of the Patents Covering the Non-Loaded Cable Technologies

2. What is Tokai University's Model of Intellectual Property Education?

2-1 Importance of Intellectual Property in Japan

It is said that Japan has achieved incredible progress after World War II. From the ruins of the war, within more or less 30 years Japan had joined the league of financially advanced countries, and still the world's expectations of Japan remain high. Yet, the post-war high growth from the 1950s to the 1980s was a catch-up time for Japan. It played the role of the world's factory—it imported resources from overseas, processed them, and exported them as products. This is how Japan's economy has grown. It could be said that the Japan of the day played a similar role to that played by China today.

One of the factors that supported this high growth was education. Tables 1 and 2 show the number of students in higher education and their constitution based on data published by the Ministry of Education, Culture, Sports, Science and Technology. Table 1 compares the number of undergraduate and graduate students in Japan with those in the Western countries. The percentage of graduate students per 1000 university students is 8% in Japan, and is smaller than the figures for Western countries, which show between 11.9 and 15.8%. Table 2 shows the percentages of Science and Engineering students in different countries. Here again, Japan shows lower figures compared to those of other countries, and the percentage of Engineering students is higher than that for Science students. These figures indicate that post-war Japanese education, particularly in higher education, has placed an emphasis on undergraduate engineering studies, in comparison to western universities. In the other words, the figures imply that the rapidly growing Japanese industry, where manufacturing was particularly important, demanded engineers with uniformly high skills. This drove the cultivation of such engineers and resulted in producing the "Made-in-Japan" goods with their reputation for quality. We should also not forget to mention that the eagerness of people at that time to work their way out of the aftermath of the war must have been one of the major contributing factors in the development of this educational trend.

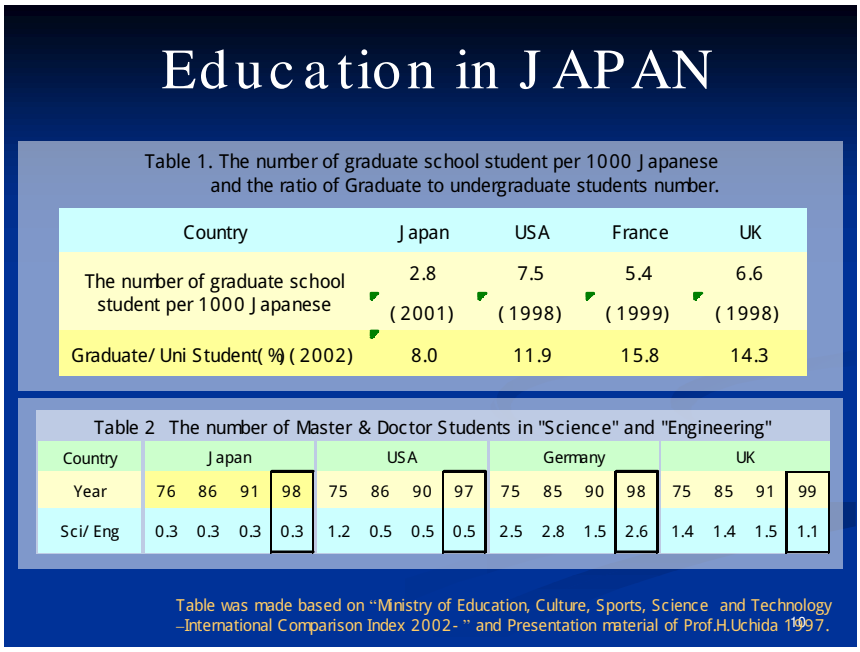
In the 1990s, Japan faced the so called "Lost Decade," when the bubble economy that relied on the burgeoning real estate prices burst, followed by a massive recession. According to the International Institute for Management Development in Switzerland, the international

competence of Japan was at the top in 1991, but dropped to 30th place in 2002. The budget deficit has increased greatly and it remains the same today. In the 21st century, Japan's manufacturing-oriented economy is facing deadlock. China and India have taken over the position as the world's factory and this causes Japan to seek for new means to achieve economic growth—one that does not depend on the mass consumption of natural resources.

In this global trend, the significance of intellectual property is increasing. In manufacturing, the weight no longer lies only on producing goods by processing raw materials, but also in creating additional value by registering the manufacturing expertise gained through production as an intellectual property. Also, the driving force behind the market has now shifted from manufacturing to the service industries, of which major production is intangible assets, that is, products made of thoughts. Such an industry demands the talent of creativity to keep on producing something novel.

In this movement, the then-Prime Minister Junichiro Koizumi issued the Intellectual Property Country Declaration in February 2002. This is a strategic national policy to promote intellectual property as Japan's new economic resource. The enactment of the Intellectual Property Basic Act and establishment of the Intellectual Property Strategy Headquarters subsequently took place, and various measures, including the annual issuance of a Strategic Program, have been implemented.

This Strategic Program mentions intellectual property education, and one recent suggestion remarked on providing intellectual property education at an early stage.



2-2 Intellectual Creation Cycle: Creation, Protection, Utilization

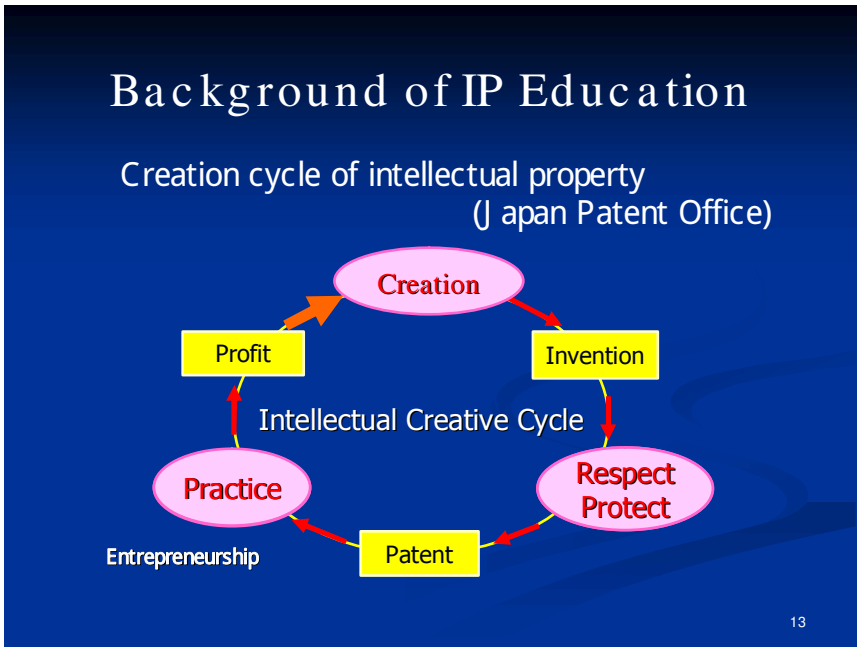
In the Intellectual Property Country Declaration, the Japanese government points out the importance of the Intellectual Creation Cycle, comprising creation, protection, and utilization. In this cycle, the created intellectual property is protected by the relevant institutions and laws, and is then utilized effectively in society. This produces profit and this profit in turn can be invested in further creational activities. This cycle clearly predicates its functions on respect for the stage of creation. Educating children in the joys of creation, and raising awareness about and paying respect to what is created play an important role in this cycle. Because such creations may not always be visible, they can be more easily used or replicated. Therefore, lack of respect for creative activities and the creation itself could cause the Intellectual Creation Cycle to fail.

Conventional intellectual property education focused on an understanding of the laws and institutions that protect intellectual property, so that such legal knowledge would serve as a means to claim or protect intellectual property rights. However, if we think about intellectual property taking Japan's future into account, it is indispensable to focus on the process of creation, which creates the actual intellectual property to be utilized by society, under

systematic protection. We believe that the utilization of intellectual property in the real sense cannot be achieved without education that covers the role of creation.

In an attempt by the Japanese government to re-establish the Japanese economy utilizing intellectual creation from 2002 and onward, the government determined to provide intellectual property education to the nation and commissioned universities, including Tokai University, to conduct research to identify the optimum manner of providing such education. The aims of such education were: raising awareness about intellectual property issues, cultivating the human resource required to realize the Intellectual Creation Cycle, and providing the optimum intellectual property education according to the young person's age. To achieve this, subdivided objectives were established. For example, intellectual property experts and researchers were expected to create new forms of business; society in general should learn more about the intellectual property system; colleges and universities should utilize intellectual property research results; and elementary and junior high schools must raise awareness of intellectual property among children. However, the concrete means to achieve these aims were yet to be discovered.

Despite these somewhat vague circumstances, we have systematically conducted intellectual property research in our school, including our elementary and junior high schools, under the support of the Japan Patent Office, between 2001 and 2004. The following sections provide a summary of our research.



2-3 Implementation of an Intellectual Property Education Program in the Elementary and Junior High School Curriculum

The first step in implementing an intellectual property education in our curriculum was to plan out a specialized university education program. The reason why we chose the university as our first focus was because we were actively working on cultivating the specialists who can work in industrial-academia collaborative projects, beside the fact that we were commissioned to undertake this research by the Japan Patent Office. We first planned out an educational program for our law school, science/engineering graduate schools, and the undergraduate faculties. This was designed to provide the information and skills that could be utilized in the actual working environment, such as a thorough understanding of the intellectual property system, the patent application method, and how to complete a patent application form. At this stage, the main issues were to identify the most suitable teaching methods for each of the art, science/engineering, and liberal arts departments.

However, we gradually realized that the real implementers of creativity or created intellectual property in society are entrepreneurs, as we mentioned earlier, and entrepreneurship is a difficult talent to suddenly develop at the university level of education. This led us to the opinion that intellectual property/entrepreneurship education must be

provided at an earlier stage of education by our experts, particularly the pedagogic specialists. We started reviewing the appropriate point at which to begin intellectual property education, and this was the beginning of our long term trials and error approach.

After this long quest, we come to the conclusion that intellectual property education should be provided through the cultivation of creativity. In this idea, the educational aim is (based on the Tokai University's foundation spirit) "to cultivate humanistic individuals who can contribute in building a peaceful and creative society through intellectual property education." In other words, such education should produce individuals who would be creative and able to pay respect to the creation, understand the importance of intellectual property, possess sufficient knowledge of intellectual property issues, and be able to put that knowledge into practice. This education, however, does not deny conventional approaches. It rather utilizes conventional approaches more effectively in order to cultivate human resource who can contribute to society.

2-4 Implications from Developmental Psychology

Our conclusion to commence intellectual property education at an early stage is supported by two developmental aspects. One aspect relates to psychological development per se and the other is psychological development under the influence of physical development.

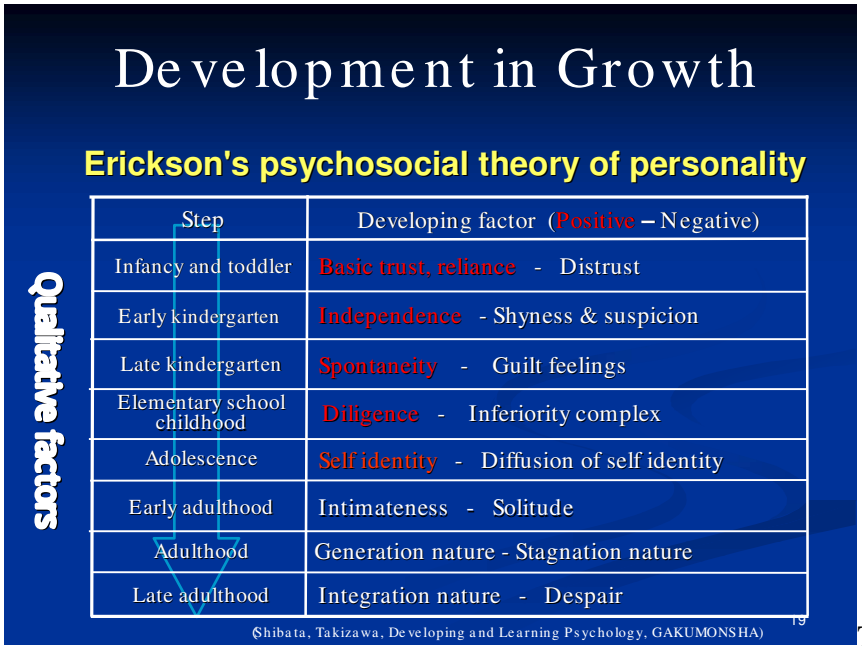


Table 3

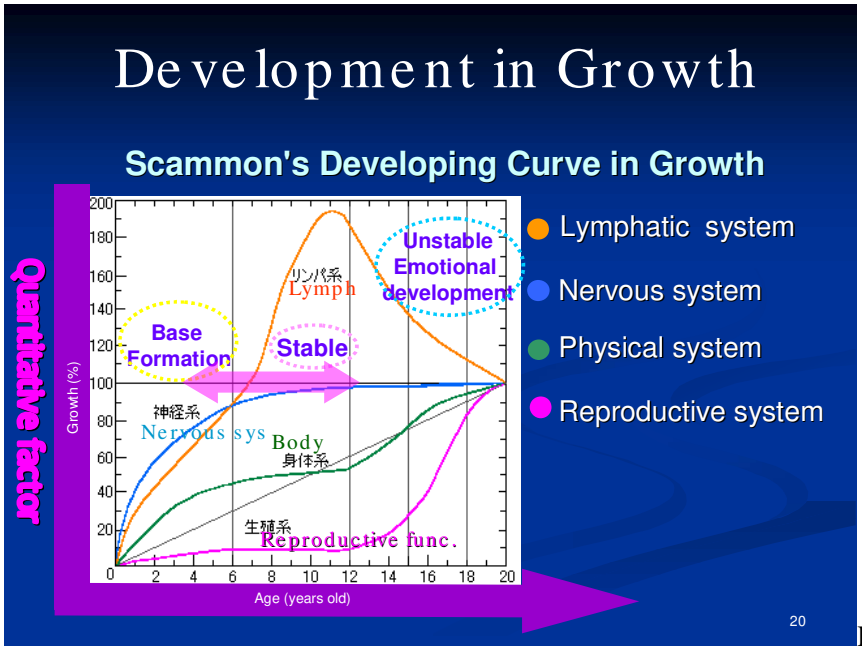


Figure 2

Our conclusion is based on our assumption that such education would not be effective unless taking account of the psychological development model suggested by developmental psychologists such as Piaget and Erikson, and the physiological development model suggested by Scammon et al.

Erikson presented different psychosocial features that are expected to develop in the different stages of "personality upgrowth." (See Table 3.) This model shows that psychosocial features such as autonomy and industry are developed between the preschool and school child period. We see this stage as a particularly important period for cultivating the creativity that can produce something novel and the entrepreneurship that motivate people to start something new in society. On the other hand, Scammon et al. presented a growth curve from birth to 20 years, which summarized the different physical growth areas according to age. Based on this model, we can assume that the period between preschool to 12 years old is the most suitable to provide foundational education as the general growth rates are stable. This model suggests that accelerated growth takes place when children enter adolescence, therefore, we assume that their mental state may be less stable compared to the earlier period. (See Figure 2.)

Based on these studies of Erikon and Scammon et al., we suggest that intellectual property education should commence from preschool. In particular, cultivating aspects such as creativity, social awareness, entrepreneurship, and respect at a young age forms an important foundation for providing advanced education, such as concerning the intellectual property system and how to utilize the relevant institutions in later years.

The following is a summary of aspects that we believe important to develop in terms of intellectual property management according to the child's age.

During the period from preschool to early years in elementary school, the focus should be on developing their sense of self efficacy and confidence, as well as encouraging their independency. And above all, cultivating creativity is critical.

In the late elementary school years, discipline in daily life is an important aspect to develop. This includes study habit acquirement and moral and ethical development.

As emotional development becomes apparent in youths at junior-high to high school, we can say that that this is the crucial time to nurture a stable mentality, a broad frame of mind, and a logical approach to decision making.

In high school, the educational focus will be on the importance of the Intellectual Creation Cycle, and the view that intellectual property becomes meaningful only when it is used in society.

University is the period when students widen their views, deepen their understanding of history and world affairs; and develop a concrete idea of their roles in the society. Therefore, we assume that we can cultivate their understanding of the relationship between intellectual property and scientific technologies, the role of economy in terms of the intellectual property system, and the value of intellectual property itself during this period. Further, we expect them to be able to make their own argument about the intellectual property system, utilizing concrete examples, such as the issues surrounding intellectual property concerning an HIV drug and a pro-patent policy. (For details, see Appendix 1 and Tokai University Research Report 2001–2004, commissioned by the Japan Patent Office.)

Up to the present day, the emphasis on education in Japan has been put on the quantity of knowledge. In light of this bias, our intellectual property education aims at developing the talents needed to create something original and new, putting ideas into practice, and contributing to society through consideration of their roles. We surmise that intellectual property education may significantly change the conventional manner of education when appropriately introduced and implemented.

2-5 Intellectual Property Education in Practice

2-5-1 Sample Cases for Nurseries, Elementary Schools, and Junior High Schools

A sample intellectual property education case for preschool children is described below. This is an example to promote awareness of creativity and copyright in different occasions in daily activities.

One technique utilizes story telling. In this method, a teacher reads a story but stops it in the middle of the story. Then the teacher encourages children to make up the rest of the story, and the children either tell the teacher their own stories or present them in front of the other children. This is a good training for children to create a variety of stories by themselves, and to learn that even more different stories can be created by listening to the other children's stories.

To raise awareness of copyright, teachers perform the following procedure. They actually gain permission from authors of stories and illustrations before they use them; such as to read

them for children, to show on a large screen, and to have children play on special occasions, such as parents' day. Then the teachers announce the fact that they have obtained permission to use the stories and illustrations before such activities. This day-to-day behavior will naturally ingrain in children the realization that one needs an owner's permission before using that person's property. Even on a daily book reading occasion, teachers read out the name of the author or the translator, if it is a foreign story, or mention about the copyright page included in the book. Showing respect for copyright through daily life activities by teachers will raise awareness of this point among children.

Handicraft is another important and effective activity for infants to train their manual dexterity, cultivate their creativity, and gain physical experience. This also provides an occasion to work together or to compare their own work with that of their friends. In any case, the attitude of the teacher is crucial.

In our elementary school, we provide a wide range of creativity education. One example is to have children think and talk about their impression of an abstract painting.

This is an example from one of our junior high schools located in Hirakata city, Osaka. In the first year of the school, pupils are instructed to find out about an inventor or entrepreneur, including their personal history and details of their inventions or business, in order to learn about the role of intellectual property in society. In the second year, pupils make a video to introduce their school for freshmen as a practical aspect of copyright study. In the third year, they make a symbol mark for their class as a graduation activity, and in this way they can learn about design rights. (Program example in Tokai University Gyosei Junior High School.)

2-5-2 Sample Cases for High Schools

We have two cases concerning teaching about intellectual property in high school: one is exclusively in a homeroom class for integrated studies and Modern Civilization Theory; and the other is as a part of a general class, such as Japanese, history, or mathematics. The high school curriculum now offers a greater number of specialized subjects than ever before. Therefore, the point in the high school curriculum is how to relate intellectual property issues with each subject. The following cases provide some examples of our high school education program.

In Japanese classes, students create poems, or make up stories from illustrations and photographs as a part of copyright studies. As well as encouraging creativity, intellectual property issues can also be woven into an awareness that copyright is significantly related to other people's creations. Creation can be a focus in physical education classes through choreographing a dance and presenting it in front of the other students. In mathematics classes, students are encouraged to present multiple solutions to a question. This gives students the incentive and experience to explore the wider possibilities. Presenting your own solution can make them aware different approaches can be made by different people. In science classes, students are instructed to create an object based on basic knowledge, for example, a bicycle. Then students present the unique features of their bicycle and perform a race. They can learn about better ideas from other students and this issue can also be related to learning about the industrial property rights. It is up to individual teachers' depth of understanding concerning the intellectual property system to effectively weave intellectual property issues into different subjects.

The class activities described above are primarily for students not only to learn about the intellectual property system but also to develop their creativity and awareness of the relationship between intellectual property and their future through studying the meaning and importance of intellectual property in society. Furthermore these activities can provide teachers with a different perspective in looking at their teaching subject areas, and an opportunity to revise conventional teaching methods and approaches. Thus we can expect these activities to provide a positive stimulation to frontline teaching.

The followings are examples of actual classes provided in Tokai University Gyosei Senior High School.

In the first year, students are instructed to undertake research about the added value of products in the Modern Civilization Theory class (one class per week; this topic spans approximately 7 classes per year). They study how value is added to a product, what is this added value, and the role of value in the usage of a product or in society. They also study the relationship between value and intellectual property. The students then present their research results. This activity is designed to introduce students to the concept of added value and intellectual property based on products that are familiar to them.

In the second year, the students have an opportunity to create their dream product in a special class. They are instructed to design a completely novel product utilizing the publicly available databases, such as the electronic catalogue provided by the Japan Patent Office. The students present their products in front of other students in the class or grade, and they must be able to describe in what ways the product is novel in their own words (approximately 12 classes in total). This activity will help them realize how many inventions are used in their daily commodities.

In the third year, students are given an opportunity to attend a lecture by a patent attorney and an entrepreneur to learn about the role of intellectual property. Although it depends on the time we can secure for this issue during the year, we attempt to design the curriculum to cover the problems involved in the intellectual property system and through talks and presentations guide students in discussing such problems and what could be the optimum system to make a more enriched society. This will help them to think about the operation of the intellectual property system for the future society to which they will contribute.

The specific issue to be chosen may vary, however the class is designed to encourage the active involvement of the students in the flow of research, presentations, and discussions.

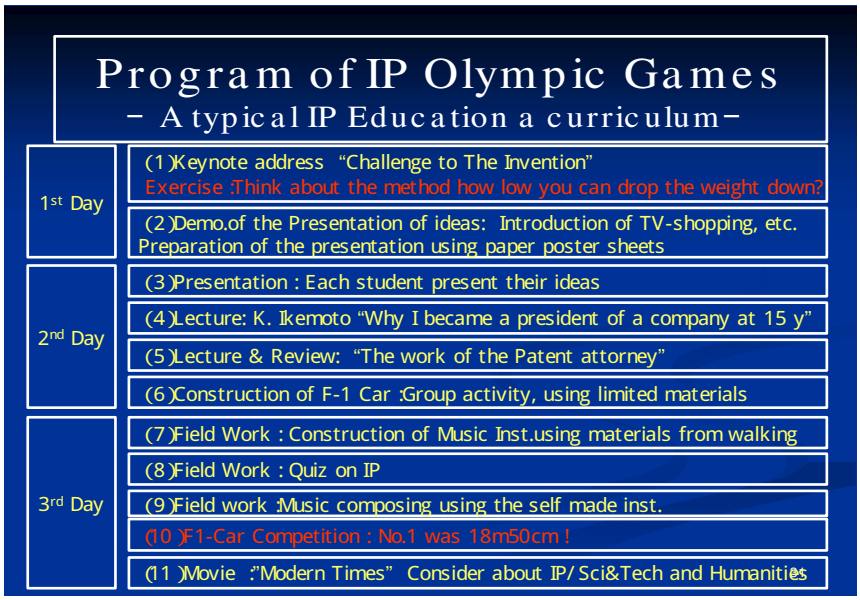
2-5-3 The "Intellectual Property Olympic Games"

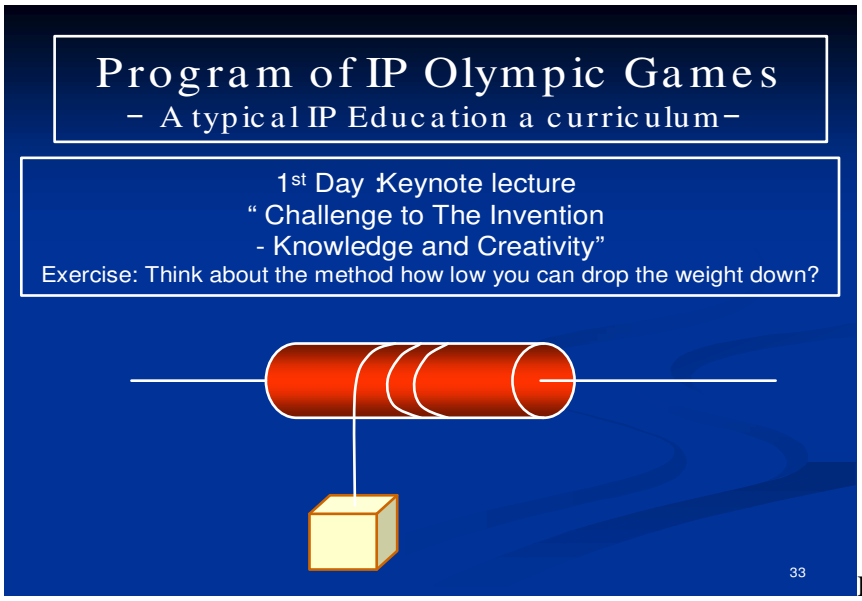
We also provide a camp-style intensive study for junior high and high school students. Tokai University has fifteen high schools, seven junior high schools, one elementary school, and four nurseries. The Intellectual Property Olympic Games is a competition between twenty students whose novel inventions have been selected from among those of more than 1,000 of the University's junior high and high school students. This is a five-day camp-style study program, which starts with a presentation of their inventions, followed by practicing to create new ideas, manufacturing, patent search techniques, understanding of the intellectual property system, and lectures by patent attorneys and entrepreneurs. Through this program, students learn to cooperate and to write a patent application as a final product. The best work will then be introduced to external patent competitions.

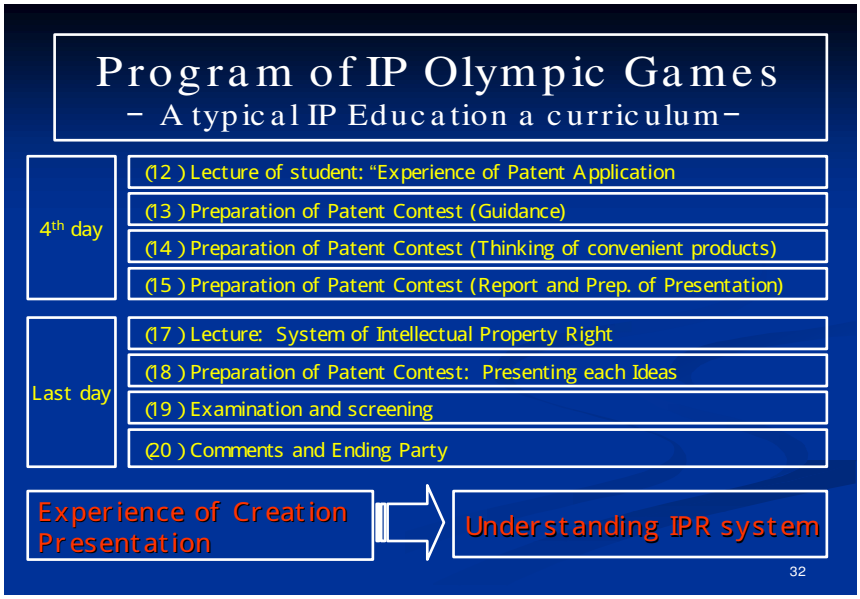
One example given as a practice to create new ideas is to think of a method to lower a weight hanging from a horizontal rod as slowly as possible (see Figure 3). The students present

their methods together with an explanation. Obviously, this requires students to have a good understanding of dynamics and material characteristics. We give high marks to ideas that offer both practicality and novelty. In a group work, students are asked to make a rubber-band-driven model car with limited materials, and which can run for as long as possible. Students must complete the task, from designing to the actual making of the car, within a limited time. They can experience the importance of teamwork and the difficulty of realizing the idea they have designed.

There is even a real case where the Intellectual Property Olympic Games actually produced a patent in the past. This patent is now on its way to production.




Program of IP Olympic Games
– A typical IP Education a curriculum–
1st Day :Keynote lecture
“ Challenge to The Invention
- Knowledge and Creativity”
Exercise: Think about the method how low you can drop the weight down?
33
Figure 3


Program of IP Olympic Games
– A typical IP Education a curriculum–
4th day
(12) Lecture of student: “Experience of Patent Application
(13) Preparation of Patent Contest (Guidance)
(14) Preparation of Patent Contest (Thinking of convenient products)
(15) Preparation of Patent Contest (Report and Prep. of Presentation)
Last day
(17) Lecture: System of Intellectual Property Right
(18) Preparation of Patent Contest: Presenting each Ideas
(19) Examination and screening
(20) Comments and Ending Party
Experience of Creation Presentation
Understanding IPR system
32

Program of IP Olympic Games
– A typical IP Education a curriculum–

2nd ~ 3rd Days F1-Car Competition
Construct using only the following materials
And compete the running "distance"

Group Working

Wood stick

1 carton Paper sheet

2 Rubber rings

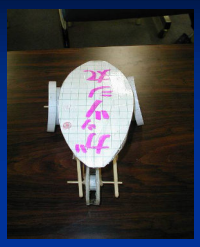
2 Cripps

How we can do it?

34

3rd Day

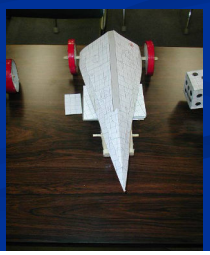
Idea full F-1 cars



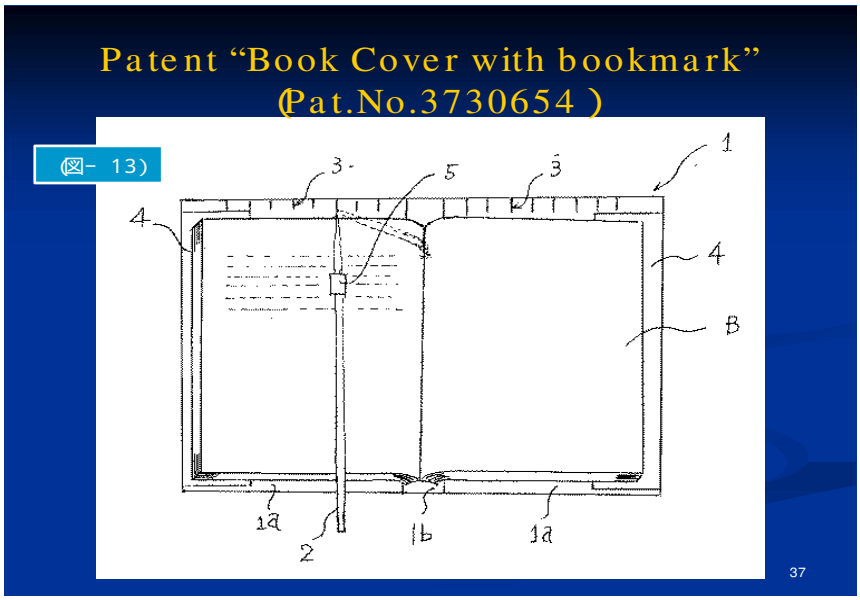








35



A sample patent selected from the Intellectual Property Olympic Games

2-5-4 Sample Cases for University

We provide a subject called Heuristic Engineering as a part of our university intellectual property curriculum. This is a half-year practical course supervised by Prof. Hanno and Prof. Tsuji of the School of Information Science and Technology, Tokai University. This course provides an understanding of the utilization of the intellectual property system through practical training in information technology, creation techniques, and debating.

In addition to the major course to which a student belongs, a variety of optional courses specializing in different topics and each providing 20 credits, are available. The Intellectual Property Course is a part of these optional courses. The Intellectual Property course provides an understanding of the intellectual property system to top up the students’ majors. The credits gained through these optional courses are registered as a degree in a minor subject as well as the degree in the major subject.

The following table shows the currently available optional courses.

Subjects concerning the Intellectual Property Legal System	200	Intellectual Property Right Laws (Industrial Property Right)
	200	Intellectual Property Right Laws (Copyright)
	200	Intellectual Property Right Theory
	300	Intellectual Property Right Laws
	300	Copyright Laws
	300	Industrial Property Right Laws
Legal Subjects concerning the Intellectual Property Legal System	200	Economic Laws
	300	Business-Related Laws
Subjects concerning Intellectual Property Management	200	Management Theory (Marketing and Advertisement/Public Relations)
	300	New Organic Materials
	300	Technology Management
	300	Patent Strategy
	300	Patent Application & Intellectual Property Right
Subjects concerning IT	200	Introduction to Networks
	200	Information Theory
	200	Cyber Security
Subjects concerning Art and Intellectual Property Legal System	300	Music Copyright
	100	Introduction to Web Design

One future challenge is to increase the specialized subjects that encourage the active involvement of students.

2-6 Characteristics of Tokai University's Intellectual Property Education

The intellectual property education established by Tokai University is characterized by its emphasis on education in the early years. This is designed to cultivate creativity and basic talents while the children are young, and then to gradually build up an understanding of the intellectual property system and its utilization as the children grow. There is no point in

teaching pupils in elementary school and junior high school about how to claim one's rights or about completing patent applications, therefore, the focus for intellectual property education for children is awareness of intellectual property, moral and ethical issues, and entrepreneurship, as the framework for their later study.

The characteristics of Tokai University's intellectual property education are as follows.

(1) The first feature of the Tokai University Model of Intellectual Property Education is that it starts from preschool
(2) Intellectual property education based on the Vaasa model of Finland
(Internal entrepreneurship education)
(3) Intellectual property education tailored for each age group
(4) Intellectual property education as an independent subject and woven into other subjects
(5) Intellectual Property Olympic Games
(6) Intellectual property education provided and supported on a school-wide scale (whereby all university nurseries, elementary school, junior high schools, and high schools have intellectual property education officers and intellectual property education committees)
(7) Intellectual property education through international collaboration

The Finnish Vaasa model is employed as a part of our education. The Vaasa model refers to the communal internal entrepreneurship education provided in the city of Vaasa in Finland. Internal here refers to mental resources. They too apply the concept of entrepreneurship in early education based on the understanding that the development of creativity and entrepreneurship (internal) will lead to the cultivation of flourishing human resources for the next generation. We have contacts with a Finnish group to exchange information and plan to collaborate on the further improvement of educational programs.

Tokai University's intellectual property education starts at the infant period, and is an important educational model both for specialists and ordinary people. The significance of intellectual property will continue to increase in the future; therefore, an educational system such as ours will be indispensable and we would again like to emphasize that this is an educational program aimed at realizing an enriched society.

2-7 Introducing Intellectual Property Education

Introducing intellectual property education into a conventional education system usually presents a variety of challenges. The following introduction process contains suggestions that we have developed based upon our own experiences.

Initial Year

- Raise awareness of intellectual property among teachers, including the school principal. Utilize government promotion catalogs and experts' lectures to disseminate the importance of intellectual property. This should create some affirmative opinion among teachers, although the number may be small. The principal's affirmation is indispensable.
- Organize a special class or event to promote creativity cultivation and to explain intellectual property issues using concrete examples for students and pupils, and evaluate their responses.

Second Year

- Provide between two and five intellectual property classes throughout the year. If possible, make the class open and ask that other teachers come and observe.
- Make some classes open to parents, and undertake a questionnaire survey about intellectual property education. Evaluate their responses.
- Hold a teachers meeting and discuss the meaning of providing intellectual property education and its importance, methods, and relationship with other teaching subjects.
- Plan and implement a systematic educational approach.

Third Year and Later

- Appoint an intellectual property education officer and establish intellectual property education related teacher organizations, such as an Intellectual Property Education Committee under the principal. Select appropriate teaching materials, resolve teachers' questions and problems, and build up the curriculum.
- Encourage the teachers to be creative and trust their teaching skills. Delegate the design and operation of the classes.
- Present a model class to other teachers to share teaching know-how.
- Invite external specialists, such as a patent attorney, and hold a special lecture.

The critical points are: plan well to gain affirmation from those teachers who are the core members of the school; and seek the initiative of the school principal. Obtaining an affirmative opinion from the local board of education is also important.

There is one more issue to think about. Intellectual property education should also be provided as a means to cultivate creativity. This is not just education to provide knowledge about the intellectual property system, but is education aiming at society's development and its sustainability. An intellectual property exhibits its value only when it is utilized in society. Understanding this point will enable this link to the real world to be brought into the place of educational practice. Promoting such education as a means to gain only theoretical knowledge about the intellectual property system and ways to utilize it will not inspire anybody to agree to introduce this subject into the curriculum.

We must emphasize the main benefits of this education model, which are: the development of creativity; it is socially conscious and practically applicable; it is an effective learning method regarding the legal system in general, not only intellectual-property-related laws. Introducing this model can improve conventional education. This is the approach that will surely win affirmation.

When teachers and parents truly understand the meaning of this education, that is the time to transmit the knowledge to students and pupils. They can then further discuss the suitability of the intellectual property system and its relationship with society. The educational opportunities offered by this model are indeed broad.

3 To Build a Sustainable Society

This chapter discusses environmental education, which is in a completely different domain from intellectual property education, in order to re-assess the importance of intellectual property education through comparing and contrasting these two educational domains.

3-1 Conventional Environmental Education

Environmental issues represent some of our most important challenges and are discussed across the world. It has even become one of the media's pet topics. Many issues, such as ways to tackle global warming and ozone depletion, and the means to build a sustainable society now hold great political significance.

When Japan was experiencing rapid growth about 40 years ago, environmental issues were local and limited "pollution problems" and the phrase "environmental problem" was little known. Dennis Meadows et al. published *The Limits to Growth*, a report for the Club of Rome in 1972. The report provided people with an opportunity to rethink how society was managed by warning that the word would reach its limits and begin to deteriorate if the current mass production and consumption continued. Due to the development of remote sensing technologies, a greater range of environmental data has become available leading these issues to be shared throughout the world. However, we have yet to come to any effective conclusion to stop global warming and our worries for the 21st century continue to increase.

3-2 Application of the Environmental Education Approach

Many discussions and suggestions have been made since the 1970s about the necessity of education concerning environmental issues. For example, the Tbilisi Declaration issued in 1977 outlined five categories of objectives for environmental education: awareness, knowledge, attitudes, skills, and participation.

Later, the Thessaloniki Declaration (1997) and the UN Decade of Education for Sustainable Development (1999) suggested that such education should encompass the wider concept of sustainability, including human rights, population, poverty reduction, food security, health, democracy, and peace with a moral and ethical imperative in which cultural diversity and

traditional knowledge would be respected. Taking account of sustainability from multiple aspects is now required as a standard.

The current stage when the optimum approach to adopt in intellectual property education is still not clear is somewhat similar to the days when the optimum approach to environmental education was not known. Considering that the approach of environmental education is now emerging into a more concrete system, we could follow the same five category approach presented above as both types of education shares a concern for sustainability.

3-3 Sustainability and the Intellectual Property Legal System

Perhaps the major issue in environmental problems is how we can conserve the ecosystem—the earth's environment. Economics is of course involved in environmental problems, in terms of resource consumption, distribution, and recycling. These issues, to a greater or lesser degree, all have an impact on the ecosystem.

However, the economic system must also be sustained and, therefore, it needs to adapt as the industrial structure evolves. When we consider this point, we again realize the importance of intellectual property's role. Although intangible added value may not depend on certain natural resources or energy, it is safe to say that intellectual property can be a driving force in economical development.

Therefore, environmental education and intellectual property education are complementary in order to deliver a full understanding of a sustainable society.

4 Postscript

This paper has summarized the intellectual property education research conducted by Tokai University between 2001 and 2004, as commissioned by the Japan Patent Office. The following items review our findings and suggest improvements for the future.

- In addition to the traditional values based on manufacturing, interest in intellectual property as an intangible asset is increasing. This also increases interest in the creativity that produces the intellectual property, as well as the conventional interest in manufacturing.
- Intellectual property education must include cultivating respect for intellectual property and entrepreneurship, as well as an understanding of the intellectual property system itself.
- Such education should be tailored according to the child's age: emphasize cultivation of creativity and social awareness while children are small, and increasing study of the intellectual property system as they get older. Repeat the past studies in every stage (cyclic method).
- Intellectual property education can learn from environmental education in terms of purpose and methods.
- Cultivation of human resources that can contribute in building an affluent and sustainable society is a common and important aim for both environmental education and intellectual property education.
- The education of intellectual-property-conscious human resources is an urgent matter in order to realize a sustainable society, and such education should be provided from an early stage. Establishing such an educational method and disseminating it are crucial tasks.
- The importance of intellectual property education should be recognized internationally, and international collaboration must be encouraged to ensure continuing educational development and to achieve a sustainable global society.

The findings and suggestions described in this paper are based on the research conducted at Tokai University Educational Foundation between 2001 and 2004. The members of the research team are listed below. These members are only representative, and many other teachers and staff were actively involved in our research. We would like to express our gratitude to them all.

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- Prof. Akira TOMONO (Dept. of Information Media Technology, Tokai University)
- Prof. Hideki MIZUNO (Dept. of Info. and Communication Technology, Tokai University)
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- Katsutoshi HIRASHIMA (Teacher of Tokai University Fuzoku Daiyon Senior High School)
- Katsuyuki KAJIKAWA (Teacher of Tokai University Fuzoku Takanawadai Senior High School)
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■ Keiko IWASAKI (Assistant Counselor, Dept. of Higher Education, Tokai University Educational System)

Appendix 1　Teachers Guide to Intellectual Property Education

This section presents the practical approaches utilized in our intellectual property education. (Quoted from *Year 2004 Japan Patent Office Commissioned Research Report,* by Masayoshi Sumida et al.)

Appendix 1-1　Nurseries

<1> Developmental Psychological and Pedagogic Characteristics in this Age Group

This is the time to develop interests and skills to think and try by themselves. Children in this stage cannot think logically, are animistic, get easily bored as their concentration span is still short, are physically active, imaginative, and interested. Their dexterity and hand accuracy are limited because some small muscles in their hands and fingers are still undeveloped.

<2> Expected Educational Achievements

Development of an intellectual property-conscious mind (90% weight) and learning about the intellectual property system (10% weight).

<3> Key Points

- Intellectual Property-Conscious Mind (Entrepreneurship and Creativity)　(90% Weight)

Ethics and morals: Distinguishing between things that belong to you and those that belong to others, basic rights, right and wrong behavior, manners, etc.

Provide environmental education, and encourage ingenuity, cooperation with others (respect for others), observation, researching, thinking, summarizing, creating (handicraft and creating from scratch), and presentation (overcoming shyness).

Encourage finding out about things, research and development, discussion and evaluation, decision making and problem solving, and avoiding problems (not fearing to make mistakes).

Give them opportunities to present their own ideas and experience challenges (to develop the sense of self-efficacy).

Develop sense of ethics and morality, and promote intellectual property awareness among parents.

- Intellectual Property System Knowledge (10% Weight)

Patent rights, copyrights, utility model rights, design rights, and trademark rights

Contents and Features

These lessons should form a foundation to think about intellectual property (absolute basic i to viii, below) through the teachers' daily attitude to show respect for intellectual property.

Intellectual Property System Knowledge Provided in Nurseries (10% Weight)

i. When you draw a picture, if someone copies your drawing, how do you feel?
Don't you feel "Oh, no. I don't like that"?

ii. When you draw a picture, if you copy your friend's drawing, how do you feel?
Don't you feel "Well, I think I've cheated"?
No one thinks it's a nice thing to do.

iii. But, when you draw a picture based on my (the teacher's) picture, you can draw well, can't you?
And… maybe people like your picture.

iv. It is not really bad to imitate someone's work.
You can imitate my drawing. Because you can learn how to draw by doing that.
But you don't feel nice if your friend copies your drawing. If you copy your friend's drawing, don't you feel that you have done something bad? Your friend may say "Don't copy me!"
Mmm, it seems that there are some rules.

v. Rather than imitating someone else's drawing, create your own!
When you see your friend's drawing, maybe you can think "Ok, I'll draw something different!" Then you can draw something special. It is special, because it is your own original idea. And no one says "Oh, you're just a copycat!" You can say "This is my work!" with confidence. Maybe people like your picture, too.

vi. Something your friend has made is precious to your friend. What you make is precious to you.
If someone writes or creates something with a lot of effort, it must mean a lot to that person.

Just like you feel what you have written or created by hard work means a lot to you.

So, if you cherish someone's work, maybe yours will be cherished too.

Then you can enjoy your drawing even more!

It is the same with your handicraft.

vii. What someone else makes, or what you have made is called "Intellectual Property."

Now you have learned that you need to cherish an intellectual property.

Let's go over that again together.

You can imitate my drawing. Because I am a teacher and you can learn how to draw from me.

But you should not copy your friend's drawing or handicraft. You should make your own drawings or handicraft.

viii. If you continue making something of your own, you may be able to become an inventor, or story teller, or artist.

Then if you continue further, one day you may create something worthy of the Nobel Prize!

You may create a famous manga such as "Doraemon" or "Pokemon", or become a composer, a musician, or a game creator.

<4> Sample Teaching Materials and Activities

* Provide practical work rather than knowledge to create children's own intellectual properties. Something visible related to copyrights, design rights, and trademark rights may be recommended. E.g. Designing (marks), making stories, creating objects with clay or Lego blocks, playing make-believe, cat's cradle, playing with dolls, naming objects outdoors, inventing a new game (maybe using some tools or objects?), presenting what children want to become (their dreams) in the future in front of others, etc.

Appendix 1-2 Elementary School

<1> Developmental Psychological and Pedagogic Characteristics in this Age Group

- This is the period to provide opportunities to develop and improve children's problem-solving abilities. Children are likely to be affected by the way they are instructed and by the process of learning. They start logical thinking. This is also the period that they

understand the consequences of their efforts and develop sociality.

- Children in the early years of elementary school can still get easily bored as their concentration span remains short (the younger, the more easily bored). They are physically active, imaginative, and interested. They can study in a group. Their dexterity and manual accuracy are limited because some small muscles in their hands and fingers are still undeveloped.
- In the middle years, personality differences become clearer. The ties between friends become stronger (beginning to be independent from their parents and being aware of group power). All the hand muscles develop, and coordination between eyes and hands improves. Thus handiwork becomes more elaborate. Their concentration duration becomes longer, and they become able to generalize about abstract concepts.
- In the upper years, children accomplish a basic level of literacy. They are capable of introspection (self-reflection and revision). Also, they can swing between childhood and adolescence, enter into puberty, be greatly influenced by friends, and become interested in the opposite sex. They can apply the knowledge and concepts from one class to a variety of problem solving. Successful experiences can help to establish self-esteem.

<2> Expected Educational Achievements

Development of an intellectual property-conscious mind (70% weight) and learning about the intellectual property system (30% weight).

<3> Key Points

- Intellectual Property-Conscious Mind (70% Weight)

Develop a sense of ethics and morality (ingrain basic rights, right and wrong behavior, manners, etc). Provide environmental education, and encourage ingenuity, cooperation with others (respect for others), observation, researching, thinking, summarizing, creating (handicraft and creating from scratch), and presentation (overcoming shyness). Encourage finding out about things, research and development, discussion and evaluation, decision making and problem solving, and avoiding problems (not fearing to make mistakes). Give them opportunities to present their own ideas and experience challenges (to develop the

sense of self-efficacy). Promote intellectual property awareness among parents.

- Intellectual Property System Knowledge (30% Weight)

Patent rights, copyrights, utility model rights, design rights, and trademark rights

Contents and Features

I. What is Intellectual Property?

II. Why Does Intellectual Property Need to Be Protected?

III. How Was the Intellectual Property System Developed?

IV. How Can We Obtain Intellectual Property Rights?

V. What Kind of Rights Are They?

VI. When Can Other People Use Intellectual Property?

(People show respect to intellectual property in their daily attitudes.)

Intellectual Property System Knowledge Provided in Elementary School (30% Weight)

I. What Is Intellectual Property?

(a) An idea that contributes to something special like a cell phone, PC, TV, or stationery, etc, has rights called “patent rights.”

(b) A piece of work such as an illustration, calligraphy, a carving, a piece of writing, lyrics, a piece of music, a computer game, an animation program, a movie, or a photograph, has rights called “copyright.”

(c) Some product designs, such as *Mickey Mouse* or *Hello, Kitty* on T-shirts, have rights called “design rights.”

(d) Marks, such as those of *Coca Cola* and *Nike*, have rights called “trademark rights.”

(e) Famous people like actors, singers, sports players, or TV personalities, can have the right to say “no” regarding their photographs or names being used without their permission.

II. Why Does Intellectual Property Need To Be Protected?

(a) We need to protect intellectual property because it is a human beings’ asset that brings us affluence both physically and mentally, in the form of science, technology, literature, music, and art.

For example, the electric light invented by Edison brought brightness to the night, enabling us to enjoy ourselves or work after dark. Nobel, who endowed the Nobel Prize, invented dynamite. Dynamite is an explosive that can be safely used in construction and demolition work. This reduced the potential deaths of many people. Bill Gates invented a piece of software called *Windows* to control a computer. He realized a world in which many people can easily uses computers. (Let's watch a video about Edison now.)

Dr. Shigeyoshi Matsumae, the founder of Tokai University, invented the "non-loaded cable." He gave us a world in which we can make a telephone call to someone in a foreign country far away.

(b) A person who has created an intellectual property, which is a shared asset of human beings, has rights called intellectual property rights under the law.

(c) Intellectual property is valuable because it is created by people's imagination and originality; however, people can easily imitate it. This is why it needs to be protected.

An intellectual property is someone's belongings, just like your book, notebook, or bag. So if you want to use someone else's belongings, you have to ask first. Helping yourself to your neighbor's apples in their garden is breaking the rules. Using someone's intellectual property without asking is the same.

(d) In today's society, anybody can use what they want on the Internet without asking. In many cases, this is violating other people's rights.

For example, when you use the Internet at school or at home to play or to look for some information, you can copy a photograph, a piece of writing, or a piece of music for yourself. This is fine, but you cannot copy these for your friend. This is actually breaking the rules.

III. How Was the Intellectual Property System Developed?

(a) How Was the Patent System Developed?

In ancient Rome and Greece, there was a system where a person who invented a new cooking recipe could use that recipe exclusively for a year.

In the 15th century, a leader of the Venetian Republic made a system where people

could not use a registered newly invented device without the permission of the manufacturer for a certain period. This is the oldest known patent system.

(b) How Was the Copyright System Developed?

Since Gutenberg invented printing technology, mass printing became possible. This caused a lot of illegal printing problems. So the state granted rights to prevent illegal printing.

(c) How Was the Trademark Right System Developed?

The origin of the trademark is the inscription made on the surface of a piece of pottery to show the name of the manufacturer. However, the Industrial Revolution, which started in England, enabled the mass production of similar products by large retailers. Creating a mark became important for manufacturers to differentiate their products from others'.

Today a trademark is regarded "a silent salesman" and a product can sell well simply because it has a well-known trademark.

IV. How Can We Obtain Intellectual Property Rights?

(a) Patent Rights: Apply to the Patent Office using the necessary application forms. If the application is accepted after assessment, the patent is registered and the right becomes effective.

(b) Utility Model Rights: Apply to the Patent Office using the relevant utility model right application forms. The application is registered without assessment and the right becomes effective.

(c) Copyrights: When a piece of work, such as an Illustration, a work of calligraphy, a carving, a piece of writing, lyrics, a piece of music, a computer game, an animation program, a character, a movie, or a photograph, has been created, the copyright becomes effective .

(d) Design Rights: Apply to the Patent Office using the relevant application forms for a design registration. If the application is accepted after assessment, the design is registered and the right becomes effective.

(e) Trademark Rights: Apply to the Patent Office using the relevant application forms for a

trademark registration. If the application is accepted after assessment, the trademark is registered and the right becomes effective.

(f) Right of Publicity: When an individual has publicity value, such as a TV personality, singer, actor, or sports player, the right becomes effective.

V. What Kind of Rights Are Intellectual Property Rights?

(a) Patent Rights: The rights that prevent other people from using a patent without permission.

(b) Utility Model Rights: The rights that prevent other people from using a utility model without permission.

(c) Copyrights: The rights that prevent other people from using a work without permission.

(d) Design Rights: The rights that prevent other people from using a design without permission.

(e) Trademark Rights: The rights that prevent other people from using a trademark without permission.

(f) Right of Publicity: The rights that prevent other people from using a person's name, photograph, etc, without permission.

VI. When Can Other People Use Intellectual Property?

(a) Patent Rights: Can be used at home.

(b) Utility Model Rights: Can be used at home.

(c) Copyrights: Can be copied and quoted for personal use. Can be copied by a teacher or students inside a class. A software package installation and backup are accepted.

(d) Design Rights: Can be used at home.

(e) Trademark Rights: Personal use is accepted.

(f) Right of Publicity: Can be used at home.

<4> Sample Teaching Materials and Activities

* Provide not just knowledge but also practical work to think about and create the children's own intellectual properties.

Something visible related to copyrights, design rights, and trademark rights may be recommended. For example, designing an original mark, creating objects with clay or Lego blocks, a factory tour, pretending to work at a sales booth, find a problem and present some solutions (for the environment, garbage, the social system, traffic…), etc.

Appendix 1-3 Junior High School

<1> Developmental Psychological and Pedagogic Characteristics in this Age Group

- This is the time to encourage children to try something more advanced so that they can learn to refine the skills they have acquired so far and adapt themselves to new challenges and opportunities. It is necessary to give them many decision-making challenges. They should be motivated to analyze their ideas of problem-solving abilities and actively communicate with adults who can evaluate the value and influence of their ideas. Also, they can swing between childhood and adolescence, are capable of introspection (self-reflection and revision), enter into puberty, be greatly influenced by friends, and become interested in the opposite sex. They can apply the knowledge and concepts from one class to a variety of problem solving. Successful experiences can help to establish self-esteem. The ego and super ego they have developed may be challenged (self-control). Sprouting of identity.

<2> Expected Educational Achievements

Development of an intellectual property-conscious mind (50% weight) and learning about the intellectual property system (50% weight).

<3> Key Points

- Intellectual Property-Conscious Mind (50% Weight)

Develop a sense of ethics and morality. Provide environmental education, and encourage ingenuity, cooperation with others, observation, researching, thinking, summarizing, creating (handicraft and creating from scratch), and presentation. Encourage finding out about things, research and development, discussion and evaluation, decision making and problem solving, and avoiding problems (not fearing to make mistakes). Give them opportunities to present their own ideas and experience challenges (to develop a sense of

self-efficacy).

- Intellectual Property System Knowledge (50% Weight)

Patent rights, copyrights, utility model rights, design rights, and trademark rights

Contents and Features

I. Why Is Intellectual Property Needed?

II. How Was the Intellectual Property System Developed?

III. What Are the Types of Intellectual Property?

IV. How Can We Obtain Intellectual Property Rights?

V. What Kind of Rights Are They?

VI. When Can Other People Use Intellectual Property?

(People show respect for intellectual property in their daily attitude.)

Intellectual Property System Knowledge Provided in Junior High School (50% Weight)

I. Why Is the Intellectual Property System Needed?

(a) We need to protect intellectual property because it is a human beings' asset that brings us affluence both physically and mentally, in the form of science, technology, literature, music, and art.

(b) A person who created an intellectual property, which is a shared asset of human beings, has the protective right called intellectual property right under the law.

(c) An intellectual property is a result of the exertion of one's imagination and originality. Irrespective of its value, people can easily imitate or steal it. This is why it needs to be protected.

(d) In today's society, anybody can infringe another's rights on the Internet. This is why learning about the intellectual property system is everybody's responsibility, not just businesses'.

II. How Was the Intellectual Property System Developed?

(a) How Was the Patent System Developed?

(b) How Was the Copyright System Developed?

(c) How Was the Design System Developed?

(d) How Was the Trademark Right System Developed?

(e) How was the Right of Publicity System Developed?

III. What Kinds of Intellectual Property and Intellectual Property Systems Are There?

(a) Ideas and simple contrivances (patent rights and utility model rights)

(b) Writing, lyrics, music, computer games, photographs, etc (copyrights)

(c) Designs (design rights)

(d) Trademarks (trademark rights)

(e) Well-known people's names and appearance (right of publicity)

IV. How Can We Obtain Intellectual Property Rights?

(a) Patent Rights: Become effective after patent application (first-to-file) and registration are complete.

(b) Patent Rights: Become effective after utility model right application (first-to-file rule) and registration are complete.

(c) Copyrights: Copyrights and moral rights become effective when the creation is completed.

(d) Design Rights: Become effective after design right application and registration are complete.

(e) Trademarks Rights: Become effective after trademark application and registration are complete.

(f) Right of Publicity: Become effective when an individual has publicity value, such as a TV personality, singer, actor, or sports player.

V. What Kind of Rights Are Intellectual Property Rights?

(a) Patent Rights: The rights that prevent other people from using a patent without permission.

(b) Utility Model Rights: The rights that prevent other people from using the utility model without permission.

(c) Copyrights: The rights that prevent other people from using a work without permission.

(d) Design Rights: The rights that prevent other people from using a design without permission.

(e) Trademark Rights: The rights that prevent other people from using a trademark without permission.

(f) Right of Publicity: The rights that prevents other people from using a person's name and appearance without permission.

VI. When Can Other People Use the Intellectual Property?

(a) Patent Rights: Can be used at home.

(b) Utility Model Rights: Can be used at home.

(c) Copyrights: Can be copied and quoted for personal use. Can be copied by a teacher or students inside a class. A software package installation and backup are accepted.

(d) Design Rights: Can be used at home.

(e) Trademark Rights: Personal use is accepted.

(f) Right of Publicity: Can be used at home.

<4> Sample Teaching Materials and Activities

* Provide not just knowledge but also practical work to think about and create children's own intellectual properties.

Something related to copyrights, design rights, and trademark rights may be recommended. For example, designing (a school logo), looking for different types of trademarks, job experience, playing a success story (pseudo experience), etc.

Appendix 1-4 High School

<1> Developmental Psychological and Pedagogic Characteristics in this Age Group

This is the time to provide intriguing and sufficiently difficult challenges to the students so that they can acquire problem-solving skills and independent thinking (utilizing their specific interests that have been developed over the last several years). Young people in this age group establish their identity. They seek social approval and at the same they are becoming more self-standing. Ability of abstract thinking and imagination adds flexibility to their

problem-solving manner, and their physical growth in these years develops their physique, agility, and strength. Some establish a clearer sense of self and of their role in society. They start to have ideas of their future occupation and an aim in life. They establish a substantial ability to conduct a study project through the stages of planning, designing, researching, and developing. These projects should be engineering-oriented.

<2> Expected Educational Achievements

Development of an intellectual property-conscious mind (30% weight) and learning about the intellectual property system (70% weight).

<3> Key Points

- Intellectual Property Conscious Mind (30% Weight)

Develop a sense of ethics and morality. Provide environmental education, and encourage ingenuity, cooperation with others, observation, researching, thinking, summarizing, creating (handiwork and creating from scratch), and presentation. Encourage finding out about things, research and development, discussion and evaluation, decision making and problem solving, and avoiding problems. Give them opportunities to present their own ideas and experience challenges. Cultivate the ability to evaluate the current situation and approaching challenges in an all-embracing manner. That is, deepen the understanding of the importance of intellectual property.

- Intellectual Property System Knowledge (70% Weight)

Patent rights, copyrights, utility model rights, design rights, and trademark rights

Contents and Features

I. Why Is Intellectual Property Needed?

II. How Was It Developed?

III. What Are the Types of Intellectual Property?

IV. What Can Be Defined as an Intellectual Property?

V. Who Can Claim Intellectual Property Rights?

VI. How Can We Obtain Intellectual Property Rights?

VII. What Kind of Rights Are They?

VIII. When Can Other People Use Intellectual Property?

IX. What Are the Potential Problems?

Intellectual Property System Knowledge Provided in High School (70% Weight)

I. Why Is the Intellectual Property System Needed?

(a) We need to protect intellectual property because it is human beings' shared asset that brings us affluence, both physically and mentally.

(b) An intellectual property right provides the creator of the shared asset of human beings with limited-period protection of the asset.

(c) An intellectual property is the result of the exertion of one's imagination and originality. Irrespective of its financial value, people can easily imitate or steal it because it is intangible. Intangible assets, such as inventions or art works, can be transmitted worldwide, therefore the damage from unauthorized use can be on a global scale. This is why it must be protected.

(d) The intellectual property system is indispensable in different organizations in modern society, including companies, public bodies, and universities to enable them to conduct their business.

II. How Was the Intellectual Property System Developed?

(a) How Was the Patent System Developed?

(b) How Was the Utility Model System Developed?

(c) How Was the Copyright System Developed?

(d) How Was the Design System Developed?

(e) How Was the Trademark Right System Developed?

(f) How was the Right of Publicity System Developed?

III. What Kinds of Intellectual Property and Intellectual Property Systems Are There?

(a) Technologies (patent rights, utility model rights, and trade secrets)

(b) Art (Copyrights, neighboring rights, moral rights, performers' right)

(c) Designs (design rights)

(d) Trademarks (trademark rights)

(e) Trade secrets (protection from business spying and illegal competition)

(f) Well-known people's names and appearance (right of publicity)

IV. What Can Be Defined as an Intellectual Property?

(a) Patent Rights: Inventions

(b) Utility Model Rights: Contrivances

(c) Copyrights: Literature, academic, artistic, and musical works

(d) Design Rights: Mass-produced industrial designs

(e) Trademark Rights: Product trademarks and service marks

(f) Trade secrets: Corporate secrets, customer lists, etc

(g) Right of Publicity: Well-known people's names and appearance

V. Who Can Claim Intellectual Property Rights?

(a) Patent Rights: Inventor (regardless of the invention is collaborative or as the inventor's employment responsibility)

(b) Utility Model Rights: Contrivance inventor (regardless of the contrivance is collaborative or as the inventor's employment responsibility)

(c) Copyright: Author (if the work is created as the author's employment responsibility, the employer becomes the copyright holder)

(d) Designs Rights: Industrial designer (regardless of the design is as the designer's employment responsibility)

(e) Trademarks Rights: Trademark holder.

(f) Trade secrets: Organization that owns the business secrets, customer lists, etc.

(g) Right of Publicity: Individual who has publicity value, such as a TV personality, singer, actor, or sports player.

VI. How Can We Obtain Intellectual Property Rights?

(a) Patent Rights: Become effective after patent application (first-to-file) and

registration are complete.

(b) Utility Model Rights: Become effective after utility model right application (first-to-file rule) and registration are complete.

(c) Copyrights: Copyrights and moral rights become effective when the creation is complete.

(d) Design Rights: Become effective after design right application and registration are complete.

(e) Trademarks Rights: Become effective after trademark application and registration are complete.

(f) Trade secrets: Become effective when an organization possesses corporate secrets, customer lists, etc.

(g) Right of Publicity: Become effective when an individual has publicity value, such as a TV personality, singer, actor, or sports player.

VII. What Kind of Rights Are Intellectual Property Rights?

(a) Patent Rights: The rights that prevent other people from using a patent without permission.

(b) Utility Model Rights: The rights that prevent other people from using a utility model without permission.

(c) Copyrights: The rights that prevent other people from using a work without permission.

(d) Design Rights: The rights that prevent other people from using a design without permission.

(e) Trademark Rights: The rights that prevent other people from using a trademark without permission.

(f) Trade secrets: The rights that prevent other people from spying or stealing business secrets.

(g) Right of Publicity: The rights that prevent other people from using a person's name, photograph, etc, without permission.

VIII. When Can Other People Use Intellectual Property?

(a) Design Rights: Can be used at home.

(b) Utility Model Rights: Can be used at home.

(c) Copyrights: Can be copied for personal use. Can be copied or quoted in a library. Can be copied by a teacher or students inside a class. A software package installation and backup are accepted.

(d) Design Rights: Can be used at home.

(e) Trademark Rights: Personal use is accepted.

(f) Right of Publicity: Can be used at home.

IX. What Are Potential Problems of the Intellectual Property System?

(a) Although a product with that includes intellectual property can be distributed throughout the world, intellectual property systems vary according to the country (this is an international trading obstacle).

(b) The intellectual property system may be used as a means of market control by advanced countries. For example, HIV drug patent issues, exploitation of genetic or biological resources of developing countries by advanced countries through privatizing indigenous knowledge about such resources as an intellectual property, etc.

(c) No jurisdiction is specified for each country, despite this being the Internet era.

(d) In this digital society, some laws, such as the copyright law, still remain the same as they were before the advent of the Internet. Such laws should be updated.

<4> Sample Teaching Materials and Activities

* Provide not only knowledge but also practical work to think and create students' own intellectual properties.

Something related to copyrights, design rights, and trademark rights may be recommended. For example, designing something (a school logo), etc.

Appendix 1-5 University

<1> Developmental Psychological and Pedagogic Characteristics in this Age Group

This is the time for students to prepare for entering into society as adults and to establish a concrete relationship with society.

<2> Expected Educational Achievements

Development of an intellectual property-conscious mind (10% weight) and learning about the intellectual property system (90% weight).

<3> Key Points

- Intellectual Property-Conscious Mind (10% Weight)

Encourage ingenuity, cooperation with others, observation, researching, thinking, summarizing, creating (handiwork and creating from scratch), and presentation. Also encourage finding out about things, research and development, discussion and evaluation, decision making and problem solving, and avoiding problems. Give them opportunities to present their own ideas and experience challenges. Develop their sense of ethics and morality.

Cultivate the ability to understand the current situation and approaching challenges in an all-embracing manner. That is, deepen their understanding of the importance of intellectual property. Also cultivate the ability to utilize the intellectual property system.

- Intellectual Property System Knowledge (90% Weight)

Patent rights, copyrights, utility model rights, design rights, and trademark rights

Contents and Features

1 Heuristic engineering

2 Intellectual Property Understanding as Literacy (I to XII)

1 Heuristic engineering

Combining creativity education and intellectual property education, teach aiming at improving imagination, inventiveness, to intellectual property registration in one flow. Typical lecture contents could be as follows:

(a) History of invention and creation

(b) Mechanism of the imagination

(c) Imagination support techniques

(d) Solution development and overview of documenting the invention

(e) History of patent system

(f) Meaning of patent search and searching methods (technology trend research and novelty checks)

(g) Patent application completion methods and procedures, and some notes on completing

(h) Creating and amending a patent application

(i) Presenting the patent application (debate style), discussion, and self assessment

(j) Submitting the finalized patent application

2 Intellectual Property Understanding as Literacy in University

II. Why Is the Intellectual Property System Needed?

(a) We need to protect intellectual property because it is human beings' cultural asset and it brings us affluence, both physically and mentally.

(b) The creator of a shared asset of human beings can claim their intellectual property as a means to protect their human rights, private rights, and property rights for a limited period.

(c) An intellectual property is a result of the exertion of one's imagination and originality. Irrespective of its financial or cultural value, people can easily imitate, steal, or pirate it. Because it retains its value worldwide, the damage from unauthorized use could be on a cross border and global scale. This is why it needs to be protected.

(d) The intellectual property system is indispensable in different organizations in modern society, including companies, public bodies, and universities, in order for them to conduct their business.

II. How Was the Intellectual Property System Developed?

(a) How Was the Patent System Developed?

(e) How Was the Utility Model System Developed?

(f) How Was the Copyright System Developed?

(g) How Was the Design System Developed?

(h) How Was the Trademark Right System Developed?

(i) How was the Right of Publicity System Developed?

III. What Kind of Intellectual Property and Intellectual Property Systems Are There?

(a) Technologies (patent rights, utility model rights, and trade secrets)

(b) Art works (copyrights, neighboring rights, moral rights, performers' rights)

(c) Designs (design rights)

(d) Trademarks (trademark rights)

(e) Trade secrets (protection from commercial spying and illegal competition)

(f) Well-known people's names and appearance (right of publicity)

IV. What Can Be Defined as Intellectual Property?

(a) Patent Rights: Inventions

(b) Utility Model Rights: Contrivances

(c) Copyrights: Literature, academic, artistic and musical works

(d) Designs Rights: Mass-produced industrial designs

(e) Trademark Rights: Product trademarks and service marks

(f) Trade secrets: Corporate secrets, customer lists, etc

(g) Right of Publicity: Well-known people's names and appearance

V. Who Can Claim Intellectual Property Rights?

(a) Patent Rights: Inventor (regardless of whether the invention is a collaborative effort or under the inventor's employment responsibilities)

(b) Utility Model Rights: Contrivance inventor (regardless of whether the contrivance is a collaborative effort or under the inventor's employment

responsibilities)

(c) Copyright: Author (if the work is created under the author's employment responsibilities, the employer becomes the copyright holder)

(d) Designs Rights: Industrial designer (regardless of whether the design is under the designer's employment responsibilities)

(e) Trademarks Rights: Trademark holder

(f) Trade secrets: Organization that owns the business secrets, customer lists, etc.

(g) Right of Publicity: Individual who has publicity value, such as a TV personality, singer, actor, or sports player

VI. How Can We Obtain Intellectual Property Rights?

(a) Patent Rights: Become effective after patent application (first-to-file) and registration are complete.

(b) Utility Model Rights: Become effective after utility model right application (first-to-file rule) and registration are complete.

(c) Copyrights: Copyrights and moral rights become effective when the creation is complete.

(d) Design Rights: Become effective after design right application and registration are complete.

(e) Trademarks Rights: Become effective after trademark application and registration are complete.

(f) Trade secrets: Become effective when an organization possesses corporate secrets, customer lists, etc.

(g) Right of Publicity: Becomes effective, when an individual has publicity value, such as a TV personality, singer, actor, or sports player.

VII. What Kind of Rights Are Intellectual Property Rights?

(a) Patent Rights: The rights that enable an inventor to use his/her invention exclusively.

(b) Utility Model Rights: The rights that enable a contrivance inventor to use his/her invention exclusively.

(c) Copyrights: The rights that enable an author to use his/her work exclusively.

(d) Design Rights: The rights that enable a designer to use his/her design exclusively.

(e) Trademark Rights: The rights that enable a trademark owner to use his/her trademark exclusively.

(f) Trade Secrets: The rights that prohibit the appropriation and leaking of business secrets and customer lists.

(g) Right of Publicity: The rights that prevent unauthorized usage of a person's name and appearance.

VIII. How Is Intellectual Property Protected?

(a) Patent Rights: Allow the rights holder to demand an injunction for direct or indirect infringement and/or claim for damages resulting from such direct or indirect infringement.

(b) Utility Model Rights: Allow the rights holder to demand an injunction for direct or indirect infringement and/or claim for damages resulting from such direct or indirect infringement.

(c) Copyright: Allow the rights holder to demand an injunction for direct or indirect infringement and/or claim for damages resulting from such direct or indirect infringement.

(d) Design Rights: Allow the rights holder to demand an injunction for direct or indirect infringement and/or claim for damages resulting from such direct or indirect infringement.

(e) Trademark Rights: Allow the rights holder to demand an injunction for direct or indirect infringement and/or claim for damages resulting from such direct or indirect infringement.

(f) Trade Secret: Allow the rights holder to demand an injunction for

appropriation and leakage of business secrets and customer lists, and/or claim for damages resulting from such appropriation or leakage.

(g) Right of Publicity: Allow the rights holder to demand an injunction for unauthorized usage of the holder's name or appearance and/or claim for damages resulting from such unauthorized usage.

IX. When Can Other People Use Intellectual Property?

(a) Patent Rights: Can be used at home and for testing and research purposes.

(b) Utility Model Rights: Can be used at home and for testing and research purposes.

(c) Copyrights: Can be copied for personal use. Can be copied and quoted by library users. Can be copied for educational usage. Software package installation, backup, and upgrading are accepted.

(d) Design Rights: Can be used at home and for testing and research purposes.

(e) Trademark Rights: Cannot be used for commercial purposes (personal use, etc.).

(f) Trade Secrets: When the information is obtained in an authorized manner.

(g) Right of Publicity: Can be used at home.

X. How Can Intellectual Property Be Licensed?

(a) Patent Rights: Can be licensed exclusively or non-exclusively by agreement.

(b) Utility Model Rights: Can be licensed exclusively or non-exclusively by agreement.

(c) Copyright: Can be licensed exclusively or non-exclusively by agreement.

(d) Design Rights: Can be licensed exclusively or non-exclusively by agreement.

(e) Trademark Rights: Can be licensed exclusively or non-exclusively by agreement.

(f) Trade Secrets: Can be licensed exclusively or non-exclusively by agreement.

(g) Right of Publicity: Can be licensed exclusively or non-exclusively by agreement.

XI. What International Intellectual Property Protection Systems Are in Place?

(a) Conventions (Convention Establishing the World Intellectual Property Organization, the TRIPS Agreement, Convention for the Protection of Industrial Property, Universal Copyright Convention, etc.)

(b) International Organizations (World Intellectual Property Organization, World Trade Organization, etc.)

XII. What Are Potential Problems of the Intellectual Property System?

(a) Although a product that includes intellectual property can be distributed throughout the world, intellectual property systems vary according to the country (this is an international trading obstacle). Harmonization and standardization are required.

(b) Disparity in intellectual property literacy exists (the intellectual property system may be used as a means of market control by advanced countries). Technological transfer is not in progress. For example, HIV drug patent issues, exploitation of the genetic or biological resources of developing countries by advanced countries through privatizing indigenous knowledge about such resources as intellectual property, etc.

(c) No jurisdiction is specified in each country despite this being the Internet era.

(d) In this digital society, some laws, such as the copyright law, still remain the same as they were before the advent of the Internet. Such laws should be updated.

<4> Sample Teaching Materials and Activities

* Provide not just knowledge but also practical work to think about and create students' own intellectual property.

(Excerpts from the Research Report 2004 commissioned by the Japan Patent Office)

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