

## A study on the development of curriculum for nurturing beauty service talents in the post-corona era (focusing on skin care)

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### 포스트 코로나 시대의 뷰티서비스 인재 양성을 위한 교육과정 개발 연구 (피부미용을 중심으로)

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**요 약 :** 본 연구는 코로나 시대이후로 가속화된 뷰티분야의 4차 산업들과 융합으로 산업에서 요구되는 실무능력을 교육하기 위한 교육과정 개발을 목적으로 진행되었다. 여러 문헌의 탐색적 조사와 전문가의견을 수렴한 결과 뷰티산업은 앞으로 단일 아이템 또는 서비스 제공이 아닌 의료, 바이오, ICT, 인공지능 기술 등이 결합된 개인맞춤형 서비스 제공 산업으로 분야가 확장될 것으로 분석되었다. 분석 내용을 바탕으로 전통적인 뷰티산업에서 요구하는 기본 직무 능력 외에 갖추어야 할 디지털 활용능력을 추가하여 교육과정을 구성하고 과목을 도출하였다. 코로나 이후의 시대는 4차 산업혁명을 기반으로 다양한 산업의 변화를 가져올 것이며 이러한 변화에 대응하여 뷰티산업의 발전과 지속가능성을 위한 인재 개발을 위해 대학에서는 산업의 변화에 항상 주목해야 할 것이다.

*주제어 :* 포스트 코로나 시대, 4차 산업혁명, 뷰티산업, 인재양성, 교육과정개발

**Abstract :** This study was conducted for the purpose of developing a curriculum to educate the practical skills required in the industry by convergence with the 4th industry in the beauty field, which has been accelerated since the Corona era. As a result of an exploratory investigation of several literatures and collecting expert opinions, it was analyzed that the field of beauty industry will expand to a personalized service providing industry that combines medical, bio, ICT, and artificial intelligence technologies, rather than providing a single item or service. Based on the analysis contents, the curriculum was composed and subjects were derived by adding digital application skills to have in addition to the basic job skills required in the traditional beauty industry. The post-Corona era will bring changes in various industries based on the Fourth industrial revolution, and in response to these

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changes, universities should always pay attention to changes in the industry to develop talent for the development and sustainability of the beauty industry.

*Keywords : Post covid-19 era, Fourth Industry Revolution, Beauty Industry, Training of Talents, Curriculum development*

## 1. Introduction

As the Covid-19 pandemic continues for a long time, it has had a great impact on all areas of society, including health, welfare, education, culture, and economy, and new situations that have never been experienced before are continuing[1,2]. Covid-19 has accelerated futurists' opinion that the fourth industrial revolution technology, including artificial intelligence, will change society[3]. The fourth industrial revolution is regarded as innovation through technology integration and has undergone drastic changes in government, industry, society, and education[4]. These changes are not exceptions to the beauty industry but are in the stage of reorganizing the traditional industrial structure, improving growth stagnation and low profitability through digital transformation, and requiring resetting of the industrial structure. In addition, the beauty industry will continue to change and converge to reorganize itself into a customer-oriented high value-added company.

The beauty industry has evolved from providing a single item or service to a fusion and complex beauty solution and has expanded to providing personalized services and products in combination with medical, bio, artificial intelligence, and ICT technologies. The digital transformation phenomenon of the traditional beauty industry is expected to increase the demand for professionals in the new industry as it seeks to transform itself into a customer-oriented high-value-added industry due to stagnant growth and low profitability[5].

According to the forecast for the demand

for human resources for beauty-related service workers, the forecast period of 2018-2028 will increase by 57,000 to 355,000 by 2028[6]. Considering the introduction of the fourth industrial technology, the number of employees in nursing, health, and personal life services, including health, social welfare, and hairdressers, is expected to increase by 165,000 compared to the standard. The beauty industry belongs to the service industry, and based on ICT technology, skin analysis, and big data, the paradigm is changing into customized management and cosmetics provision services. With the prospect of becoming a new growth engine for the beauty industry and cosmetics market in line with these changes, the customized cosmetics sales system was introduced in March 2020 to train experts who can mix and subdivide cosmetics and national qualification examination system for customized cosmetics dispensing managers has been implemented[7,8]. Customized cosmetic dispensing managers need to integrate with the smart beauty sector, which is leading the fourth industrial revolution, to provide skin care and customized solutions, to use beauty devices that combine ICT technology, and to use big data and consulting[9]. The fourth industrial revolution will bring about a variety of changes in the beauty industry and a change in companies and industries. At the request of the industry, we would like to propose ways to identify the necessary education courses for companies and industries, improve the sustainability of the beauty industry, and strategically respond to future strategies. This study investigates the restructuring of the beauty industry structure

after the fourth industry and the post-corona era and presents the training course for future human resources in the beauty industry.

## 2. Research method

In this study, the theoretical background of the Fourth industrial revolution, changes in the industrial environment, the convergence of the fourth industry and the beauty industry in the post-corona era, and the current status and prospects of human resources were collected and analyzed. In order to achieve the purpose of this study in the field of beauty and cosmetics, various literature studies and demand analysis of beauty-related industries were reflected in this study. Requirement analysis opinions were collected in the form of intensive interviews with experts from each company, and consisted of 8 experts from

each industry from skin diagnosis device companies, IT technology companies, beauty education companies, and medical and beauty-related companies. Based on the industry analysis, a competency unit to be considered in the operation of human resource education in the beauty and cosmetics fields was introduced, and a model for appropriate human resource education and major competencies required by the industry was established, and the curriculum.

## 3. Literature review

### 3.1. Fourth Industrial Revolution and the Service Industry

Since the 18th century, the 3rd industrial revolution has achieved great development in human history, the 1st industrial revolution has spread production facilities using hydraulic

Table 1. Curriculum development procedure

Environmental analysis and needs analysis
<ul style="list-style-type: none"> <li>- (Analysis of industrial environment) Analysis of industrial trends, trends in human resources, regional trends, and the direction of human resource development in preparation for the future industry in the Fourth Industrial Revolution</li> <li>- (Comprehensive analysis) Occupational present and future, human resources demand outlook based on internal and external environmental analysis</li> <li>- (Selection of occupational groups) Selection of occupational groups in the field of nurturing talents based on the results obtained from environmental analysis</li> </ul>
↓
Job definition and setting of major ability model
<ul style="list-style-type: none"> <li>- Details of the derived profession Classify and define the duties required to perform the duties</li> <li>- Expert verification of factors such as ability unit / job and ability unit element / work importance, suitability, etc. based on the classified job</li> </ul>
↓
Deriving a subject
<ul style="list-style-type: none"> <li>- Derivation of educational subjects related to abilities in consideration of sub-abilities, knowledge, skills, and values through main ability competence modeling</li> <li>- Derivation of major job ability subjects in consideration of ability units / responsibilities, ability unit elements / work contents, size, relationships, etc. selected in the process of major ability modeling</li> <li>- Analyzing the contents described in the definition of related abilities of major ability, and deriving subjects</li> </ul>

and steam engines, 2nd Industrial Revolution uses conveyor belts and electricity[10]. In the 2010s, intelligent information technologies such as Internet of Things (IoT), Big Data, Artificial Intelligence (AI), Mobile and Cloud Computing began to change at a faster pace.

Market research agency Gartner announces 10 major outlooks to watch after 2017 through the Symposium / IT Expo, with immersive technologies like virtual reality and augmented reality among people or between people and systems. It is changing the way it communicates and expects 100 million consumers to shop in augmented reality by 2020. The beauty industry is also actively marketing augmented reality (AR) and virtual reality (VR) at a rapid pace.

A composite term of beauty tech and beauty and technology, artificial intelligence (AI) connects a variety of technologies to the beauty industry, including the Internet of Things (IoT), big data, cloud, nano technology, mobile, and biotechnology. It is a solution that allows to easily experience a variety of beauty services that suit the tastes of consumers. Using augmented reality (AR) solutions based on face recognition technology, can experience virtual makeup, coordination, molding, etc., and at the hair shop, can easily

select the hair style that suits for a long time. It is expected that the fusion of beauty and IT technology will evolve into customer custom services[11,12].

### 3.2. Beauty industrial environment

Beauty services tend to continue to grow in collaboration with the tourism and medical industries, and have evolved into a fusion / complex beauty solution because they provided a single item or a single service. In that form, beauty equipment and ICT are most often combined, and it is changing by providing personal services and products after skin diagnosis using smart phones[13]. The field of skin care, which is a category of the beauty industry, is closely related to the cosmetics industry. The total production scale of the domestic cosmetics industry in 2018 was 15,502.8 billion won, and the trade balance surplus exceeded 5 trillion won, and the production performance increased by about 14.7% compared to 2017 in the previous year. This is considerably higher than the domestic GDP growth rate (3.0%) and the manufacturing industry GDP growth rate (1.7%). The keyword that is currently changing the beauty industry most strongly is "digital." Cosmetics and services have always

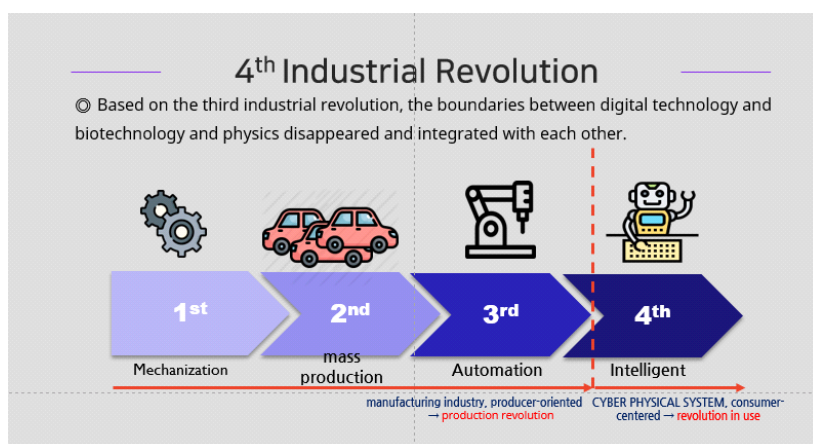


Fig 1. Changes in the business paradigm of the IoT-based beauty and health industry.

had a need for "personalized" solutions[14]. Until now, consumers have been accustomed to uniform classification types such as "dryness, combination skin and oilyskin", but skin diagnosis technology, smart phones, and wearable devices have become widespread, and consumers are trying to freely diagnose and measure skin. The number of people is increasing. Beauty companies that have read the development and customization trends of these digital technologies have introduced services that combine beauty tech technology in all beauty categories such as skin care, color cosmetics, and perfumes, and integrate them with IT, biotechnology, etc[15]. And is developing more diversely. Global beauty company L'Oreal has announced its transformation into a digital beauty company and in March 2018 acquired Augmented Reality + Artificial Intelligence-based beauty tech startup ModiFace. In Japan, Samsung Electronics' C-Lab spin-off company "Lulu Wrap" has developed "Lumini" that utilizes Lyonsan processing and artificial intelligence technology, and utilizes accurate skin measurement and analysis data to be optimal for each customer. They provide a service that recommends customized cosmetics. In addition,

AmorePacific, a leading domestic beauty company, accumulates big data and provides beauty services to the data obtained through IOPE lab, which measures the skin condition of consumers for free and presents solutions. Figure 2 shows providing specialized skin information and solutions by accurately measuring skin temperature, pigment, oil moisture, elasticity, wrinkles, and lipid. This is a new business model, the digital "DNA" is internalized to enhance the competitiveness of the company. LG Household & Health Care established Jen Story, a joint venture with biotechnology specialist MacroGen in 2016, to enter the custom cosmetics market based on consumer genetic analysis data. Olive Young and Mimi Large and small companies such as Box and Nose Story have set Beauty Tech as a new growth force and are seeking diversified attempts and alliances.

As the domestic beauty industry market expands, the government is also supporting changes by reflecting the interests and demands of "customized" consumers differentiated by individual characteristics in the spread of consumption trends that emphasize digital technology development and individuality. A customized cosmetics model project was

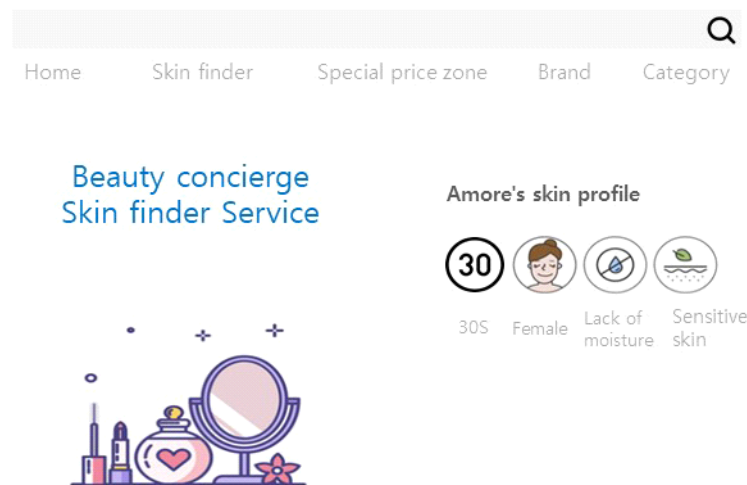


Fig 2. Beauty Concierge Skin Finder Service Utilizing Amore pacific Big Data authorship: Amorepacific official homepage.

promoted in 2016 centering on customized cosmetics, one of the new growth engines, and the first national qualification test was conducted in March 2020. In order for the customized cosmetics industry to be properly established, it is important to break down the boundaries of traditional industries and approach customers through convergence with ICT technology and Internet Things (IoT) technology to provide services to users. Thus, sales of completely new products and services are increasing in the beauty industry through the combination and convergence of various industries[16,17]. The major IoT smart beauty products are shown in [Table 2].

### **3.3. Current status and prospects of human resources in the field of beauty services**

The beauty industry is trying to improve growth stagnation and low profitability through digital transformation, and it is necessary to reset the industrial structure, and the beauty field to reorganize into a customer-oriented high-addition company will merge with change in the future will be repeated. Innovation is required compared to the Fourth industry of the traditional beauty industry, and it is expected that the fields of ICT technology + gene analysis + beauty will be integrated and the direction will change to provide customer-customized smart beauty services. In order to respond to such changes, it is inevitable to complete specialized education and training in the fields of beauty and skin care, and to train digitally integrated human resources in the field of beauty with the ability to utilize digital devices and data analysis. ICT application in the beauty market is still unexplored compared to the application of various services in other industries[19]. The market size is predicted to be 6.69 billion dollars, and the market size is predicted to be 8.82 billion dollars in 2022 at an annual growth rate of 7.7%. According to the Worldwide IoT Spending Guide report, as the

market size and outlook for the beauty and personal care sector, and the digital development, the heterogeneous cultural and level gaps between countries in beauty consumption are rapidly closing, and personalized consumer demands are increasing. To meet this, the need for manpower to provide differentiated products and services is expected to increase.

### **3.4. Analysis of the needs of beauty-related industries**

With the trend of reorganization of the traditional industry required in the Fourth industrial revolution, which has been accelerated more rapidly since the Corona era, and the digital transformation of companies in the beauty industry, a leading curriculum reflecting the Fourth industry trend is introduced to nurture related personnel requested, the contents of which are as follows: DTC (Direct To customer) DNA test permits and DNA test results are analyzed according to the expanded circumstances of the items to have the ability to consult with customers, and through this, it is possible to provide consulting tailored to the life style cycle throughout the health & beauty field[20,21]. The importance of manpower training was emphasized. Opening of personalized customized skin care or cosmetics-related subjects, opening of skin measurement-related subjects and requesting for equipment for clinical use, opening of subjects related to obtaining a customized cosmetic formulation manager's certificate, field mirror-type medical practice room, intensive classes in the medical field, and related subjects are required became As for the demand for equipment, equipment and environment that can practice One-Stop Smart Advisor were required due to the introduction of a skin diagnosis device for a customized skin care solution, equipment related to customized cosmetic preparation, a DNA analysis kit, and a 3D printer.

Table 2. Small and medium-sized businesses IoT Smart Beauty Technology Roadmap

Product	Detailed technology
Beauty Smart Mirror	<ul style="list-style-type: none"> <li>- Collect video information through camera sensors, etc., measure and diagnose skin conditions by video recognition and analysis technology</li> <li>- Beauty information processing and management through IoT and cloud services, beauty information sharing through open API and personal information de-identification, and connection interface provided</li> <li>- Providing personalized cosmetics prescription and hair styling suggestion service in connection with current weather information and fashion information</li> <li>- Beauty Personal pattern analysis and custom beauty recommendations through learning artificial intelligence based on big data</li> <li>- Provides various beauty information such as skin age, skin elasticity, clarity, brightness, and health through augmented reality and mirror-type display, and provides interactive beauty UI/UX through voice recognition and touch interface</li> </ul>
Virtual makeup	<ul style="list-style-type: none"> <li>- Process image information from mobile apps through IoT and cloud, and provide makeup simulation and cosmetics information and related services</li> <li>- Beauty UI/UX that provides services such as virtual makeup experience and cosmetic recommendations through augmented reality, artificial intelligence, and mobile apps</li> </ul>
Mask pack, Scalp care	<ul style="list-style-type: none"> <li>- Process skin image information and provide beauty UI/UX through IoT technologies such as smartphone apps and Bluetooth and cloud services</li> <li>- Analyze and quantify skin condition through artificial intelligence image recognition technology</li> <li>- Providing personalized skin prescription services such as collagen and elastin generation using skin care technologies such as LED 3-wavelength light source and micro-current</li> </ul>
Skin care device, Skin analyzer	<ul style="list-style-type: none"> <li>- Skin condition information collected by the skin diagnostic analyzer is processed and managed via IoT technology and cloud services to analyze skin pores, oil / moisture, wrinkle condition, skin moisture and more</li> <li>- Recognition provides technology for recognition, and provides personalized services.</li> <li>- Personalized cosmetics prescription and manufacturing service linked with current weather information</li> <li>- Providing services for instant manufacturing and use of personalized products</li> <li>- Use of IT technology such as IoT, camera sensor, LED light, image sensor</li> </ul>
Wearables skin care device	<ul style="list-style-type: none"> <li>- Check beauty information such as UV exposure and skin damage information through a patch-type sensor attached to the skin</li> <li>- Through IoT technology, the information collected by the patch-type sensor is linked with the smartphone app</li> <li>- UV exposure warning indicator beauty UI/UX provided through smartphone app</li> </ul>
Hair care	<ul style="list-style-type: none"> <li>- Hair diagnosis information collected through near-infrared sensors is linked with hair analysis and prescription services through IoT</li> <li>- Numericalization of hair color, scalp condition, and hair condition based on artificial intelligence image analysis</li> <li>- Recommend Hair Care Products and Services Through Artificial Intelligence Deep Learning</li> <li>- Provision of instant manufacturing and use services for personalized products</li> <li>- Personalized hair dye consultation through augmented reality</li> </ul>

authorship: Korea technology and information promotion agency for SMEs, Small and medium-sized businesses IoT Smart Beauty Technology Roadmap[18].

Researcher Reconstruction

## 4. Result and Discussion

### 4.1. Post-Corona Beauty Human Resources

#### Definition

Based on the literature search and industry needs survey, we set the talent types in the beauty field required in the post-corona era, and Table 3 shows the outline of the job, the common jobs to be performed in the job, and the jobs to be additionally performed. The image of human resources needed in the beauty field was named "Smart Beauty Advisor". The smart beauty advisor is a fusion of beauty service fields adapted to the Fourth industrial revolution. The common duties of multi-personnel are customer consultation, diagnosis and analysis of the

condition of hair, skin, body shape, scalp, cosmetics, beauty equipment, etc. To provide services by utilizing. In addition, it plans and manages the execution of beauty tasks, and provides beauty data analysis and customization services. It was analyzed that the tasks to be additionally performed should be equipped with big data utilization and customized solution consulting ability through individual DNA analysis, diagnosis ability using ICT, beauty device utilization ability, and customized cosmetic preparation and management ability.

### 4.2. Setting job model and deriving subjects

The derivation of major subjects was carried out through the derivation of NCS-type subjects. NCS (National Competency standards) is the

Table 3. Post-Corona Beauty Human Resources Definition and main task

Beauty Human Resources Definition	Main task
Smart Beauty Adviser	<p>[job overview]</p> <ul style="list-style-type: none"> <li>- Smart beauty advisor is a talent for convergence service in the beauty field suitable for the Fourth industrial revolution</li> </ul> <p>[common duties]</p> <ul style="list-style-type: none"> <li>- Customer consultation, skin, body type, scalp condition diagnosis and analysis</li> <li>- Provision of services using cosmetics and beauty equipment, and planning and management of Beauty care business</li> <li>- Beauty data analysis and customized cosmetic preparation</li> </ul> <p>[added job]</p> <ul style="list-style-type: none"> <li>- Big data utilization and customized solution consulting through individual DNA analysis</li> <li>- Reinforcement of ICT diagnosis and beauty device utilization skills training (Beauty Tech)</li> <li>- Customized cosmetic preparation and management duties</li> </ul>



national systematization of the knowledge, skills, attitudes, etc. required to perform duties in the industrial field by industry sector and level, and the ability necessary to successfully perform the job in the industrial field. It refers to the classification and standardization of knowledge, skills, and attitudes at the national level. After setting the job model and verifying the competency unit, the NCS learning module was developed to design the curriculum corresponding to the NCS after setting the subjects that can educate the verified competency unit and competency unit elements. Researcher checked whether there is [22,23]. If NCS was not developed, self-development was carried out by referring to the job types of the similar NCS classification system.

Table 4 shows the subjects derived by considering the relation between the search for relevant data and related jobs for the purpose of deriving NCS-type subjects. 'Clinical measurement big data', 'Smart beauty care', 'Customized skin care', 'Customized cosmetics preparation manager', 'Client communication', 'Medical coordinator', 'DNA coordinator', 'Bio cosmetic practice' total 8 subjects am. The subject derivation was prepared in consideration of the content and relationship of the elements of the competency unit after setting the job model and the competency unit.

## 5. Conclusion

In this study, in response to the environment that is having a major impact on society and the beauty industry due to the prolonged COVID-19 pandemic, and the Fourth industrial revolution accelerated by this and the convergence and convergence of the beauty industry, the industrial structure is transformed through digital transformation. The purpose of this study was to develop a curriculum for nurturing talents required by the new beauty industry and to derive subjects. The Fourth Industrial Revolution

is based on the Tertiary Industry, where the boundaries between digital technology and technologies such as biotechnology and physics have disappeared, and things in a technological revolution that is fused with each other Internet of Things (IoT), Big Data (Big Data), Artificial intelligence (AI), mobile (Mobile), cloud computing (Cloud Computing) and other intelligent information technologies are changing by fusing with other fields. Beauty industry is also evolving into a fusion / composite beauty solution with a single item or a single service provision in line with these changes. The key word that is currently transforming the beauty industry most strongly is "digital," combining the needs for "personal custom" solutions, allowing companies to tailor their consumer needs to beauty such as skin care, shade cosmetics, and perfumes. All categories We are introducing services that combine beauty tech technology. It has entered a stage that requires resetting the industrial structure through digital transformation, and in the future, changes and convergence will be repeated to reorganize into a customer-oriented, high-value-added company. As the background of the beauty field and the overall industry has changed, the human resources required for the talent required in the related industry have changed. In this study, as a result of an exploratory study of the literature and opinions of experts in the beauty field, practical skills such as ICT application ability, data analysis ability, beauty device usage ability, DNA test result in analysis, and counseling ability were presented. Based on the opinions presented, a total of 8 subjects were derived and presented in addition to the basic curriculum required for skin beauty among the beauty industry. It is a necessary course to nurture human resources with the digital application ability required by the industry and to have competitiveness in the beauty service industry. It is a process that sets core duties and sets competencies. It was intended to lay the foundation for the operation of the curriculum.

Table 4. Derivation of Fourth industry convergence skin beauty course

NCS subdivision	Ability Unit (Level)	Ability unit element	Subject name
Skin care	Clinical efficacy evaluation (5)	01. Setting up clinical trial protocol	Clinical measurement big data
		02. Write a clinical trial plan	
		03. Apply for clinical trial	
	Skin Beauty Skin Analysis (3)	01. Cleansing	Smart beauty care
		02. Analysis and evaluation of skin condition	
		03. Write a skin care plan	
Self-development	Skin information DB management	Managing customer information	Customized skin care
		Creating a customer management chart	
		Apply skin peeling	
		Managing problem skin	
	skin prescription research	Establishing a prescription R&D plan	Customized cosmetics preparation manager
		Experiment with prescription development	
	communication skills	Document comprehension ability	Client communication
		Document writing ability	
	Medical Practical Response	Consultation for medical treatment	Medical coordinator
		Managing customers after medical procedures	
		Understanding Medical Practices	
		Responding to Medical Customer Complaints	
Utilization of DNA analysis service	DNA analysis test	DNA coordinator	
	Analyzing DNA Analysis Data		
	Explaining DNA Analysis Results		
Cosmetic quality inspection	Collection and storage of cosmetic samples	Bio cosmetic practice	
	Preparation of cosmetic microbiological test solution		
	Testing Total Aerobic Liver and Specific Bacteria		

University education must change in the future to focus on fulfilling a role to nurture talents needed for the future. The fact that face-to-face services are important has not changed in the beauty industry, so we need to respond to

changes by defining basic skills and competencies needed for the future, and nurturing talents with creativity and convergence spirit rather than simple job-oriented training will be.

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