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A Study on Artificial Intelligence Education Design for Business Major Students

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Abstract

Purpose: With the advent of the era of the 4th industrial revolution, called a new technological revolution, the necessity of fostering future talents equipped with AI utilization capabilities is emerging. However, there is a lack of research on AI education design and competency-based education curriculum as education for business major. The purpose of this study is to design AI education to cultivate competency-oriented AI literacy for business major in universities. **Research design, data and methodology:** For the design of AI basic education in business major, three expert Delphi surveys were conducted, and a demand analysis and specialization strategy were established, and the reliability of the derived design contents was verified by reflecting the results. **Results:** As a result, the main competencies for cultivating AI literacy were data literacy, AI understanding and utilization, and the main detailed areas derived from this were data structure understanding and processing, visualization, web scraping, web crawling, public data utilization, and concept of machine learning and application. **Conclusions:** The educational design content derived through this study is expected to help establish the direction of competency-centered AI education in the future and increase the necessity and value of AI education by utilizing it based on the major field.

Keywords : AI Education, Data Literacy, Business Major, Public Data

JEL Classification Code : A22, I29, L86, O39

1. Introduction

The 4th Industrial Revolution, represented by artificial intelligence (AI), big data, internet of things (IoT) and cloud, is maximizing productivity in various industries and has a great influence on the quality of our lives and job changes (WEF, 2016). The world economic forum (WEF) predicts that 55 million new jobs will be created by 2022 related to AI, indicating that this will have a greater impact on the talents who will lead the future society (WEF, 2018). From this perspective, it is essential to cultivate AI capabilities as members who will lead an AI-based society not only from an economic point of view but also from an educational point of view. Major countries around the world are also actively working in the field of education to secure an edge in AI technology and human resources (Kim, 2019). In October 2018, MIT in the U.S. announced the establishment of Stephen A. Schwarzman College of Computing, which defines AI as the future language that science and engineering students as well as humanities and social sciences should use, teaches AI to all students, and integrates it with other disciplines (Graham, 2018). Stanford University established The Stanford Institute for Human-Centered Artificial Intelligence (HAI) in March 2019 to research, guide and develop human-centered

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artificial intelligence technologies and applications. In addition, China is promoting the cultivation of human resources at the government level by presenting the basic framework for AI education through the Beijing agreement on AI and education in 2019 (Zhao, 2019). In addition, several countries, such as Japan, Israel and India, are preparing for the era of AI by reorganizing their existing SW education into AI-centered education (IITP, 2017; KOFAC, 2019).

In 2019, the Korean government announced the national strategy for AI and set the goal of providing AI education across all careers and all occupations and fostering the world's best AI talent. In addition, specific policies were divided into three areas, divided into AI construction, AI utilization and AI harmony. This shows that AI is recognizing that it is an important future industrial base and emphasizes the necessity and importance of data utilization (MSIT, 2019). In addition, looking at the content related to talent training in the 2019 next generation AI development report, more than 30 universities nationwide established AI colleges while opening AI departments and majors, and 75 universities developed 89 AI-related departments or supplementary textbooks.

The importance of universal AI education that supports the flexible use of future generations of talent is being emphasized in line with the innovative changes in the industrial structure where the use of AI is expanding (Kim, 2019). Artificial intelligence capable of inferencing, such as machine learning, speech, visual and hearing, cognition, interpretation, situational understanding, etc., is applying the phenomenon of creating new added value by fusion with other fields (Roll & Wylie, 2016). Meanwhile, while this importance is accelerating, research on AI education design and competency-centered education curriculum as universal education is lacking (Jho, 2017). Currently, the contents of AI education are mainly composed of general understanding of AI concepts and principles, data-based machine learning using data analysis, and deep learning understanding (Lee, 2020; Ryu & Han, 2019; Woo, Lee, Kim & Lee, 2020). However, there is a lack of systematic framework research and curriculum development research according to the educational subject and educational purpose. In particular, at the present time when AI education is expanding, universities are required to make continuous efforts to cultivate AI-related talents, and it is necessary to explore educational goals and detailed education contents for those majoring in business. Therefore, in this study, for AI education in university education, for the purpose of using AI for problems encountered in daily life and industrial fields for commercial and economic students, we intend to specify educational components and design detailed curriculum.

2. Literature Review

2.1. AI Competency in Intelligent Society

Experts define an intelligent information society as a society in which intelligence is maximized and the overall national society is innovated and new values are created under the ICT infrastructure established so far. The 4th Industrial Revolution, which was triggered by the development of advanced intelligent information technology, has two implications for education. It can be said that it is a question of adapting to new social changes, that is, cultivating competent human resources suitable for social needs, and examining the educational feasibility of intelligent information technology to support them. In particular, the educational application of intelligent information technology can solve current educational problems that do not reflect learners' interest, interest, and level. Already, the possibility has become a reality, related services are being developed and applied, and practical educational outcomes are being brought about. Accordingly, the core competencies of learners required in an intelligent information society are shown in Figure 1 (Yoo, Kim, Jeon, Yu, & Bae, 2020).

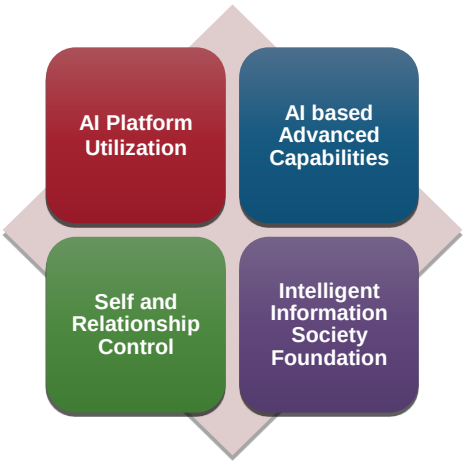

Figure 1: The Core Competencies of Learners in Intelligent Information Society

The first is the ability to utilize the AI platform, which is the ability to utilize the AI platform in relation to artificial intelligence that will be used more actively in the future. The second is AI-based thinking competency, which means basic competencies that must be possessed in an intelligent information society such as digital literacy and programming. The third is the ability to control relationships with oneself and others, such as task attachment and commitment, coordination and cooperation,

etc., which are related to the control of relationships between oneself and others. The last and fourth is AI-based advanced thinking ability, which encompasses computing thinking ability, problem solving ability, creativity, logic and reasoning ability (Park, Ahn, Jang, Yu, Kim, Bae, & Yoo, 2020).

Based on such core competencies in the intelligent information society, in order to prepare for changes in intelligence minds and competencies, such as the use of data for artificial intelligence, the ability to flexibly use new technologies in one's life and professional knowledge is required.

2.2. Competency based AI Literacy Education for Business Major Students

AI literacy is an individual's ability to use AI technology as a tool and critically evaluate it and use it appropriately in everyday and work situations, and can be defined as the ability to communicate and cooperate efficiently with AI (Long & Magerko, 2020). According to a study on the analysis of artificial intelligence curriculum at domestic and overseas primary and secondary schools, the main contents of education included AI concepts, perceptions, expressions and reasoning, machine learning, artificial neural networks, natural interactions and social influences (Lee, 2020). According to this study, it was considered that research to concrete and systematize detailed educational content and scope setting according to educational goals related to artificial intelligence should be conducted continuously. Meanwhile, according to a study on the current state analysis of artificial intelligence curriculum at SW-Centric universities, AI education is being attempted mainly in computer major subjects in connection with concepts such as discrete mathematics, computer vision and algorithms (Woo et al., 2020). According to the study, in order to expand universal AI education as liberal arts education, it is necessary to convey the concept of overall AI, and not only to understand the concept, but also to expand it to practice such as big data analysis and Algorithm implementation.

There is an active movement to expand artificial intelligence education in schools and various educational institutions, reflecting the times when the necessity of artificial intelligence education is expanding and job changes are already taking place. It focuses on cultivating the ability to recognize and solve problems using artificial intelligence through combination with various academic fields. In other words, competency-centered education as a literacy skill that understands artificial intelligence and knows how to properly use it in various contexts is emerging. In particular, the curriculum of regular education at each elementary, middle and high school level tends to consist of a curriculum of understanding and experiencing the main principles of artificial intelligence required for living in the age of artificial intelligence, or linking with Data literacy (Ryu & Han, 2019; Hong & Kim, 2020). On the other hand, compared to the movement for artificial intelligence education for elementary, middle and high school subjects, research on concrete curriculum is still insufficient in university education. In the case of university education, it is necessary to consider not only the linkage between various disciplines and understanding the principles, but also the ability to actually use artificial intelligence (Jho, 2017; Woo et al., 2020).

In order to prepare for the rapidly changing job changes in the future era, it is not necessary to pass on simple knowledge, but education for the ability to read and write skills in problem solving situations (Richardson & Delaney, 2009). Currently, as the use of AI is becoming more common in various industries, a curriculum for AI education is required, but research on technology education in terms of capacity building for non-IT majors, especially business major students, is insufficient, and there are few studies for AI education in particular. It is important to understand the concept of artificial intelligence in order to cultivate actual problem-solving competence, but considering that AI is gradually expanding to jobs, it is time to need AI literacy competency/curriculum that can encompass technology utilization competency (Ryu & Cho, 2021; Frey & Osborne, 2017).

Recently, SW-Centric universities are operating with computing thinking skills and SW utilization and programming-related subjects for SW education (Park, 2019), but they still lack AI-related subjects and require more diverse references and curriculum. Therefore, this study aims to design an education curriculum for cultivating AI literacy-based technology convergence problem-solving capabilities for non-SW majors, students in business major and economics who have relatively low AI technology utilization and accessibility in the current job situation. This is expected to be a basic study to refer to in the future for the opening of AI-related liberal arts education programs at various universities.

3. Research Methods and Materials

In this study, the purpose of this study was to design an artificial intelligence curriculum to cultivate software and AI application capabilities and problem-solving capabilities for business major students. In order to develop a detailed educational curriculum suitable for the target audience and educational purpose, the contents were extracted through the analysis of domestic and foreign preceding studies. In addition, after conducting three

Delphi surveys, the overall direction of the course was set and the main components were derived through two expert consultations.

The Delphi method is widely used in the social sciences and education fields including SW education fields as a method of predicting based on expert opinions through questionnaires, based on the principle of quantitative objectives and the principle of democratic decision-making in which multiple judgments are more accurate than those of a single person when there is no accurate information (Rauch, 1979; Rowe, Wright & Bolger, 1991; Woudenberg, 1991). In this study, several statistical analysis methods such as validity ratio and stability verification were used to measure the accurate estimate of the Delphi survey method. The Likert scale has an advantage in that it shows high reliability by ensuring consistency across many people. In addition, errors can be minimized by directly using the response values of the subjects, and the validity is high because various questionnaire items are used. The Likert scale can be constructed in various ways, such as 3-points, 5-points and 7-points, but the 7-points scale is used when a more sophisticated answer about the respondent's attitude toward the measurement target is required. In this paper, a more reliable survey was conducted using the Likert 7-points scale.

As the main components derived, the overall concept of AI was converged with literacy skills that can read and write for problem solving, as well as problem-solving skills based on the ability to manipulate actual data and software. However, considering the characteristics of the business major subjects (Sung, Kim, & Kim, 2015), the developed AI and data analysis technologies were effectively utilized rather than high-level technology development capabilities. It was converged to consist of data analysis items using Python with the aim of acquiring basic skills at a level that can demonstrate insights for problem solving by job category. Summarizing the results of the convergence, the educational components largely set detailed goals of (1) understanding of AI, (2) ability to use data and software using Python, and (3) presenting ideas for solving problems using AI based on data analysis. (1) Understanding AI - The target sub-content area is composed of AI concepts, AI history, and use cases derived from the analysis of previous research related to AI liturgy. In addition, in order to clarify the curriculum for (2) data analysis practice and (3) the possibility of using AI in connection with industrial issues, three semi-open expert surveys were conducted with 20 experts participating in the Delphi survey.

The Delphi survey is a research method that collects opinions from experts with in-depth relevant knowledge and experience in relation to current issues to determine the main contents of the study, and it is very important to select a panel with qualifications related to the research topic (Okoli & Pawlowski, 2004). Delphi is a research method that determines the main contents of research by collecting opinions from experts with deep relevant knowledge and experience in relation to current issues. So, it is very important to select a panel with qualifications related to the research topic. In the Delphi survey, The Delphi survey, conducted three times, 20 experts participated. Their majors are Business major, Computer Education and Computer Engineering, and their work experience is data processing and analysis, and they have more than a master's degree in artificial intelligence-related work for more than 5 years. Table 1 shows the number of people by field. Previously, in the expert consultation for establishing detailed educational goals, experts including education majors were received to reflect the educational context such as the subject of education and the type of education, and in the Delphi survey, the level of use of Python programming, connection with AI, and possibility of use in the field In order to clearly judge and specify the content, it was composed mainly of people with field experience related to data and AI.

Table 1: Delphi Survey Target Distribution (AI-related Experts & Big Data Processing and Analyst)

	Business Information			Computer Education			Computer Engineering		
	Master's Degree	Ph.D. Candidate	Ph.D.	Master's Degree	Ph.D. Candidate	Ph.D.	Master's Degree	Ph.D. Candidate	Ph.D.
Researcher		1	1		1	2		1	1
Developer	1	1	1			1		1	2
Professor			2			2			2
Total	**7**			**6**			**7**		

The field expert survey was conducted using the Likert scale, which is widely used for the purpose of identifying and predicting phenomena based on expert group opinions and judgments, and Lawshe (1975) as a method of verifying the validity and suitability of the survey results. It was analyzed based on the presented CVR (Content validity

Ratio) (Lawshe, 1975). In addition, the reliability of the questionnaire was increased by using Cronbach's Alpha, which measures the internal consistency of the Likert scale mean M value and CVR value of the questionnaire result (Cronbach & Shavelson, 2004).

The value of CVR is measured as shown in Equation (1), and Steiner and Norman (Streiner & Norman, 2015) interpreted that as shown in Table 2, when there are 20 or more experts, when the CVR value is 0.42 or more, it is statistically significant and the content is valid.

$$CVR = \frac{n_e - \frac{N}{2}}{\frac{N}{2}} \quad (1)$$

n_e: The number of experts who responded as appropriate
N: Total number of responding experts

In the first and second expert Delphi questionnaires, the content areas, content elements, and related packages of the business and business-affiliated AI basic education course extracted through two expert consultations were presented. The content area was divided into 11 categories, and the content validity was based on the Likert 5-points scale, and when the appropriateness was 2-points or less, the questionnaire was conducted to write the basis for the response on the evaluation scale. The order of the Delphi investigation was carried out as shown in Figure 2. First, for the first Delphi survey, the first survey paper prepared through domestic and foreign research, literature research and expert advice was prepared. The Delphi first survey included all the traditionally treated contents of the three components, narrowed the scope according to the purpose of this course, but focused on elaborating in consideration of the connection between the three components. In the second Delphi survey, Table 2 provides examples of data analysis and AI application problem solving in consideration of the evaluation of content areas/elements modified by reflecting the first Delphi opinion, and review of the composition between items, and industry prospects related to business sectors. In order to carry out the proposed problem solving example, a questionnaire was conducted with the sub-elements of the educational content to be dealt with in the data analysis component and the packages to be dealt with.

Figure 2: Process of Delphi Survey

4. Results and Discussion

In the quantitative analysis performed in the Delphi survey, the higher the quantitative result of the expert's preference, the higher the expert's preference can be interpreted, and the degree of expert consensus can be confirmed through the stability. If the difference between the expert's questionnaire responses in the repeated questionnaire results is small, it can be judged that the response is high, and this is interpreted as securing stability. If all experts have the same opinion, the stability value will be 0. There is also a clear difference in the answers of the 20 experts who responded on the Likert scale. In the processing of responses including the recognition part for step-by-step Open Question, the CVR value was calculated and then the significance of the corresponding answer was proved by analyzing whether the value is 0.42 or higher. That is, if the response results are significantly different, the language is concluded as meaningless to the series.

4.1. Results of the First Delphi Survey

The AI application curriculum proposed in this study was designed based on prior research such as analysis of related literature and thesis, and 3 rounds of expert Delphi research and analysis. In the case of the first expert questionnaire, it was conducted on the appropriateness of the necessary areas and content elements in the curriculum for understanding artificial intelligence and the basics of data analysis. Therefore, it was designed by reflecting the opinions of experts on the presentation of overall opinions on educational design for students in business major, the appropriateness of content areas and content elements, and the appropriate educational content, language, and effective order and composition for business major. Python has been used by many researchers and data mining experts due to its diversity and reliability, and is one of the most widely used languages for analyzing big data in science, finance, social network services and business (Diez & Çetinkaya-Rundel, 2016).

Table 2: Area/Content Elements for Python Language & 1st Analysis Results

Area / Content Element			M	Degree of convergence	Degree of Agreement	CVR	Selected
Content Element	1.Python Basics	1. Function	4.55	0.20	0.80	0.80	O
		2. Data Types (List, Tuple, Dictionary)	4.45	0.20	0.80	0.70	O
		3. Internal Function, Method	4.40	0.22	0.78	0.80	O
		4. Class	4.05	0.50	0.50	0.40	X
		5. Module	4.25	0.25	0.75	0.60	O
		6. Package	4.35	0.22	0.78	0.70	O
		7. Exception Handling	4.11	0.50	0.50	0.37	X
		8. Input Output	4.45	0.20	0.80	0.60	O
		9. Regular Expression	4.05	0.50	0.50	0.37	X
	2. Basic Mathematics	1. Differentials	3.05	0.67	0.33	(0.20)	X
		2. Integrals	2.80	0.67	0.33	(0.40)	X
		3. Linear Algebra	3.15	0.67	0.33	(0.20)	X
		4. Basic Statistics	4.20	0.25	0.75	0.60	O
	3. NumPy	1. Introduction to NumPy	3.85	0.50	0.50	0.40	X
		2. N Dimension Matrix	3.65	0.50	0.50	0.10	X
		3. Matrix Operation	3.70	0.50	0.50	0.10	X
	4. Pandas	1. Pandas Overview	4.45	0.20	0.80	0.80	O
		2. Data Type (Series, DataFrame)	4.35	0.20	0.80	0.60	O
		3. Data Loading	4.35	0.20	0.80	0.60	O
		4. Data Manipulation (Merge)	4.35	0.20	0.80	0.60	O
		5. Data Manipulation (Arithmetic Operation)	4.35	0.20	0.80	0.60	O
		6. Data Manipulation (Hierarchical Index)	4.10	0.50	0.50	0.40	X
		7. Data Analysis (Statistics, Sort)	4.25	0.39	0.61	0.50	O
		8. Data Analysis (Group by)	4.20	0.44	0.56	0.40	X
	5. Data Visualization	1. Data Visualization Overview	4.55	0.20	0.80	0.90	O
		2. Graph Concept and Application	4.55	0.20	0.80	0.80	O
		3. Matplotlib Overview	4.55	0.20	0.80	0.80	O
		4. Seaborn Overview	4.45	0.20	0.80	0.80	O
		5. Map Visualization Process	3.55	0.25	0.75	0.10	X
		6. Naver Map API Utilization	3.35	0.29	0.71	0.00	X
		7. Map Visualization using Folium	3.35	0.33	0.67	(0.10)	X
	6. Web Crawling	1. Web Crawling Overview	4.00	0.44	0.56	0.50	O
		2. Web Page Structure	3.90	0.50	0.50	0.40	X
		3. Web Crawling using Request	3.90	0.50	0.50	0.30	X
		4. Web Crawling using Selenium	3.80	0.44	0.56	0.30	X
		5. Web Crawling using Beautiful Soup	3.85	0.50	0.50	0.30	X
	7. Data Application	1. Data Analysis using Public Data	4.15	0.25	0.75	0.70	O
	8. Machin Learning	1. Supervised Learning	4.00	0.50	0.50	0.40	X
		2. Unsupervised Learning	3.85	0.50	0.50	0.20	X
	9. AI Understanding	1. Image Analysis Overview	3.45	0.25	0.75	0.20	X
		2. Image Classification, Recognition	3.40	0.25	0.75	0.10	X
		3. Natural Language Processing Overview	3.55	0.25	0.75	0.30	X
		4. Word Cloud	3.60	0.25	0.75	0.30	X

As for the results of the first Delphi survey, the degree of agreement, convergence, and CVR values for each content element were calculated as shown in Table 2, and the validity was verified using Cronbach's Alpha. When the number of respondents was 20, areas lower than the CVR threshold of 0.42 were excluded. The content elements of the second questionnaire were different compared to the results of the first questionnaire, and the sub-factors were also different accordingly. The content area, content elements and package results in Table 3 were verified using Cronbach's Alpha in the second questionnaire. As a result of the first survey, Class, Exception Handling and Regular Expression were removed from the Python basic part. Most of the contents of basic mathematics have been removed, which the items of Differentials, Integrals, and Linear algebra have been deleted, and only basic statistics remain. NumPy can be partially used in coding, but considering the continual usability or scalability of the code, it is not essential due to the nature of the series, according to the opinions of experts. Pandas can be partially used in coding, but some functions of Data Manipulation and Data Analysis have been removed according to the opinions of experts due to the nature of the series. Also, map-related contents such as Map visualization and Naver Map API Utilization have been removed. And, in the case of Web Crawling, there was an opinion that students in business major might feel somewhat difficult and that they could familiarize themselves with the concept with refined data. Due to the nature of management, the content elements were changed according to the opinions on the practice of experiencing the entire process from data preprocessing to visualization using public data of the subject of interest.

Table 3: Python Data Analysis Framework Library required for Business Major Curriculum & 1st CVR Analysis Results

Python Data Analysis Framework Library	M	Degree of Convergence	Degree of Agreement	CVR	Selected
1. NumPy	4.00	0.50	0.50	0.20	X
2. Pandas	4.60	0.20	0.80	0.80	O
3. Maplotlib	4.30	0.20	0.80	0.60	O
4. Seaborn	4.05	0.50	0.50	0.30	X
5. Scipy	3.20	0.58	0.42	(0.30)	X
6. TensorFlow	3.45	0.63	0.38	0.10	X
7. Keras	3.45	0.67	0.33	(0.30)	X
8. Request	3.45	0.33	0.67	(0.10)	X
9. Pytorch	3.05	0.67	0.33	(0.40)	X
10. Hadoop	2.60	1.00	0.00	(0.50)	X
11. Apache spark	2.50	0.70	0.30	(0.60)	X

4.2. Results of the Second Delphi Survey

As a result of the second questionnaire, a lot of pre-processing is performed by deleting missing data or outliers in the data pre-processing part, rather than correcting them if there is enough data. It was reflected that it was necessary to practice text data. In addition, the package features and usage related to data analysis were accurately informed. In the case of business major, understanding of basic statistics may be low when considering high school courses. Therefore, it was reflected in the content element to cultivate understanding of actual analysis because it was said that design was necessary as a part where learning about basic statistics level was possible. In addition, it was decided to exclude the parts related to Map Visualization as a whole.

Table 4: Area/Content Elements for Python Language & 2nd Analysis Results

Area / Content Element			M	Degree of Convergence	Degree of Agreement	CVR	Selected
Content Element	1.Python Basics	1. Function	4.68	0.50	0.80	0.89	O
		2. Data Types (List, Tuple, Dictionary)	4.58	0.50	0.80	0.79	O
		3. Internal Function, Method	4.68	0.50	0.80	0.89	O
		4. Module	4.53	0.50	0.80	0.79	O
		5. Package	4.53	0.50	0.80	0.79	O

		6. Input Output	4.37	0.50	0.80	0.79	O
	2. Basic Mathematics	1. Linear Algebra	3.68	1.00	0.50	0.26	X
		2. Basic Statistics	4.21	0.50	0.75	0.58	O
	3. NumPy	1. Introduction to NumPy	3.95	1.00	0.50	0.47	X
	4. Pandas	1. Pandas Overview	4.74	0.00	1.00	0.89	O
		2. Data Type (Series, DataFrame)	4.63	0.50	0.80	0.79	O
		3. Data Loading	4.63	0.50	0.80	0.79	O
		4. Data Manipulation (Merge)	4.63	0.50	0.80	0.79	O
		5. Data Manipulation (Arithmetic Operation)	4.58	0.50	0.80	0.68	O
		6. Data Manipulation (Hierarchical Index)	4.47	0.50	0.80	0.58	O
		7. Data Analysis (Statistics, Sort)	4.63	0.50	0.80	0.79	O
		8. Data Analysis (Group by)	4.63	0.50	0.80	0.79	O
	5. Data	1. Data analysis using Public Data	4.53	0.50	0.80	0.89	O
	6. Data Visualization	1. Data Visualization Overview	4.58	0.50	0.80	0.89	O
		2. Graph Concept and Application	4.63	0.50	0.80	1.00	O
		3. Matplotlib Overview	4.47	0.50	0.80	0.79	O
		4. Seaborn Overview	4.42	0.50	0.80	0.79	O
		5. Explorative Data Analysis	4.26	1.00	0.60	0.47	X
		6. Map Visualization	3.84	1.00	0.50	0.26	X
		7. Naver Map API Utilization	3.74	1.00	0.50	0.16	X
	7. Web Crawling	1. Web Crawling Overview	4.00	1.00	0.50	0.37	X
		2. Web Page Structure	3.95	1.00	0.50	0.26	X
		3. Web Crawling using Request, Selenium, Beautiful Soup	4.00	1.00	0.50	0.37	X
	8. Machin Learning	1. Supervised Learning	3.89	1.00	0.50	0.47	X
		2. Unsupervised Learning (Clustering)	3.89	1.00	0.50	0.47	X
	9. AI Understanding	1. Natural Language Processing Overview	3.53	0.50	0.75	0.05	X
		2. Word Cloud	3.42	0.50	0.67	(0.05)	X

Table 5: Python Data Analysis Framework Library required for Business Major Curriculum & 2nd CVR Analysis Results

Python Data Analysis Framework Library	M	Degree of Convergence	Degree of Agreement	CVR	Selected
1. NumPy	4.00	0.50	0.75	0.58	O
2. Pandas	4.68	0.00	1.00	0.89	O
3. Maplotlib	4.47	0.50	0.80	0.79	O
4. Sklearn	3.84	1.00	0.50	0.26	X
5. Surprise	3.32	0.50	0.67	(0.26)	X
6. Beautiful Soup	3.79	0.50	0.75	0.37	X
7. Selenium	3.74	0.50	0.75	0.16	X
8. Seaborn	4.00	1.00	0.50	0.47	X
9. Scipy	3.61	0.75	0.63	0.22	X
10. Tensorflow	3.42	1.50	0.25	0.05	X
11. Keras	3.58	1.00	0.50	0.05	X
12. Request	3.47	0.50	0.67	(0.05)	X
13. Pytorch	3.11	1.50	0.00	(0.37)	X

4.3. Results of the Third Delphi Survey

The third Delphi Survey evaluated the contents area/elements revised by reflecting the second Delphi opinion, reviewed the composition between items, and evaluated the use of business major, and the method of learning progress. Compared to the 1st and second rounds, the third Delphi survey included more detailed information on the sub-factors, and included understanding of AI in the first and second weeks as a common factor for AI liturgy derived from prior research and expert advice. Particularly, since there are many cases of dealing with text data in the case of business and economics among expert opinions, practice related to text data is essential, and it was applied as it was proposed to organize the practice of data summarization by importing public data. In addition, the use of packages for pre-processing was also important, and the part was revised and reflected.

Based on the changed content, the hierarchical structure and suitability between content elements and areas were finally reviewed and reflected in Table 6. In addition, regarding examples of solving problems through linkage between AI and data analysis, the top 5 cases with high frequency were extracted from freely-formed opinions. Among them, as examples that can be used as public data analysis practice, the 12th week consists of cases in which students practice themselves, and the 13th week, the development is requested and reorganized by an artificial intelligence expert, so that students can understand the contents of data analysis practice and overall understanding of machine learning. And it was configured to cultivate the capability of using SW AI for problem solving. Weeks 14-15 consisted of setting the problem to be solved related to the major through project-based learning, analyzing the related public data to identify the phenomena and derive implications, and further refine the solution idea using machine learning.

Table 6: The Curriculum for the Business Major

Area / Content Element				
Week	**Middle Area**		**Small Area**	
1~2	Understanding of AI		What is AI?	1. Concepts of AI, Machine Learning, Deep Learning
				2. History of AI
				3. Examples of AI application
3	Deep Learning Overview		Deep Learning	1. Definition of Deep Learning
				2. Understanding fundamental of Deep Learning
				3. Best Practice example of Deep Learning
4	Data Analysis	Python Basics	Function	1, Function overview
			Data Type and Data File Processing	1. List
				2. Tuple
				3. Set
				4. Dictionary
			Internal Function and Method	1. Internal function and method
5~7	Data Analysis using Python	Pandas	Pandas Overview	1. What is Pandas?
			Data Type	1. Series
				2. Data frame
			Data Generation	1. Series generation
				2. Data frame generation
				3. Loading CSV, EXCEL Files
				4. Index generation
			Data Selection	1. Data view (Columns, Values)
				2. Data selection(rows, columns, loc, iloc)
				3. Selecting range data
				4. Data selection using conditions
				5. Data selection using filters
				6. Data combining

			Data Manipulation	1. Change data
				2. Delete data
				3. Handling missing values
				4. Insert data (Insert, Append)
			Hierarchical Index	1. Hierarchical index
			Data Analysis	1. Head, Tail, Describe
				2. Switching row and column
				3. Data sorting
				4. Statistical function
8~9		Data Visualization	Data Visualization Overview	1. Data visualization overview
			Matplotlib	1. Introduction to matplotlib library
				2. Chart configure
				3. Bar chart
				4. Line chart
				5. Pie chart
				6. Scatter chart
				7. Histogram
				8. Introduction to Seaborn library
10~11	AI Understanding with Data	File Processing and Web Scraping	Data Input/Output	1. Import CSV, Excel, JSON Files
			Web Scraping	1. Webpage structure
				2. Data loading from Web
				3. Web scraping
			Open API	1. Data loading using Open API
			Data Save	1. Data save
		Web Crawling	Overview	1. Web Crawling overview
			Requests	1. Request module
			Beautiful Soup	1. Beautiful Soup
			Making Web Crawler	1. Making Web crawler
12		Data Analysis	Data Analysis using Public Data	1. Preparation of public data for analysis
				2. Data preparation
				3. Data analysis
				4. Data visualization
13		Machine Learning	Examples of Machine Learning	1. Recommendation system using Naver movie information
				2. Real estate price prediction
				3. Keyword analysis of recent news articles and election speeches
				4. Credit card sales prediction
14~15	Project		Project Based Problem Solving	1. Discovering insights through data analysis
				2. Suggesting ideas for using machine learning

5. Conclusions

Artificial intelligence is not a specific technology, but a kind of higher concept in which various technologies are fused, leading the 4th industrial revolution. Therefore, AI education for fostering future talent required by the era of the 4th industrial revolution should focus on flexibility and creative problem solving ability according to innovative paradigm changes such as the demand for ICT-based convergence technology, innovative change in industrial structure and platform business. Competency-based training should be provided. This is because in order to

cope with rapid technological change, the emphasis is on strengthening the education system centered on creativity in knowledge acquisition and problem-solving capabilities and activating industry-academia-research cooperation. In addition, using AI to understand the rapidly changing trends of the times and to understand how to use artificial intelligence as a business major in preparation for future job changes. In addition, there is a need for a universal curriculum in which practical skills can be cultivated and an eye on whether to solve the problems faced in everyday life and industrial fields. Currently, the need for AI education has expanded to software non-majors, but there is insufficient research on curriculum development for AI education in business major, and in particular, research on various educational targets and educational goals is required.

In this study, the necessary competencies of business major students required according to the changes and prospects of artificial intelligence in the era of the 4th industrial revolution were identified. We aimed to design a curriculum that can meet the goals of cultivating creative problem-solving, cooperative skills, critical thinking skills and AI literacy skills. To this end, AI basic education was divided into 11 content areas, content elements, and related packages were extracted and designed. Through 3 rounds of expert questionnaires, we verified the appropriateness of the design direction for the basic items and contents composition of data analysis of the curriculum, and the effective learning process order for humanities students to cultivate AI literacy skills. In particular, in the AI understanding with data area of the proposed curriculum, we searched for topics tailored to business and economics and established hypotheses. For hypothesis verification and analysis, public data can be collected and utilized, processed and analyzed in the desired form, and then the hypothesis can be verified through visualization. In addition, in the project area, you can explore the possibilities of using artificial intelligence by checking how data analysis and machine learning can be used to solve problem situations in real companies and institutions related to your major in the project area. In addition, it is designed to raise the right awareness of technology by helping to understand the social impact of technology through analysis of various technologies and discussion activities on the social impact of AI algorithms. This configuration can be a way to increase the understanding of AI and arouse the interest of learners so that they can utilize it.

It is expected that the AI curriculum proposed in this study will help establish the direction of AI education in universities. In particular, it is worth applying the data analysis and AI utilization factors derived in this study for institutions that set educational goals based on software practice. On the other hand, this study has a limitation in that it can be tight in terms of operating hours, as the contents of data analysis and AI in the curriculum for one semester are comprehensively dealt with. This suggests a linkage with prerequisite courses and a flip-learning type of education operation. In addition, since the results of this study are largely occupied by data analysis, care must be taken not to miss the connection between AI and data and proceed with education. In future research, it is required to improve the curriculum and prepare teaching strategies so that the derived curriculum is applied to the actual classroom situation, and AI literacy elements can be handled within the curriculum in a balanced manner based on the feedback of students and instructors. And also, the SW·AI education curriculum for commerce and business major students proposed in this study is structured so that they can acquire diverse knowledge ranging from a scientific approach of technology to social impact. It is important to raise awareness and use of AI through practical activities and practices as well as theoretical knowledge. Therefore, it is expected that the design direction and strategy presented in this study can serve as basic data for designing related education programs in the future. It is expected to be reborn as an AI talent by acquiring basic skills at a level that can reveal insights for problem solving by job group by effectively utilizing the developed AI and data analysis technology rather than high-level technology development capabilities.

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