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Areas of Ethical Inquiry Related to Artificial Intelligence

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Abstract

Purpose: This study aims to explore areas of ethical inquiry related to artificial intelligence and what tasks need to be solved in each area.

Method: We reviewed various Eastern and Western literature and various media reports related to artificial intelligence and artificial intelligence ethics.

Results: Artificial intelligence technology is widely used in almost all fields, and is seeking development to the stage of general artificial intelligence (AGI), which is similar to human natural intelligence. In this process, unethical issues are being raised along with serious concerns that artificial intelligence may threaten humans. Accordingly, areas that need to be ethically explored in relation to artificial intelligence are divided into four areas: establishment of ethical principles for establishing artificial intelligence policy, ethical prediction and analysis in artificial intelligence research, artificial intelligence developer ethics, and artificial intelligence user ethics. It can be.

Conclusion: Tasks to be solved in each area of ethical inquiry include the creation of international level ethical principles and treaties and monitoring organizations, the development of 'explainable artificial intelligence' technology for ethical prediction and analysis of artificial intelligence, and engineering ethics for artificial intelligence developers. The establishment of the concept, development of the education system, and development of an integrated artificial intelligence education program for artificial intelligence users were presented.

Keywords: Artificial Intelligence, Artificial Intelligence Ethics, Artificial Intelligence Developer Ethics, Artificial Intelligence User Ethics, Engineering Ethics

1. Introduction

Artificial intelligence is a type of civilization that serves human interests based on various capabilities, including human intelligence[1]. Recently, this innovative technology has been developing rapidly due to competitive research and development between companies and countries. While the world's leading companies, universities, and research institutes are selecting artificial intelligence technology as their next-generation research and development project, technologies seen in movies, such as game agents, self-driving cars, and humanoid robots, are appearing in real life. Additionally, machine translation, chatbots, and voice recognition artificial intelligence agents are already being applied in users' daily lives, changing the interactions between business participants and society as a whole[2].

This artificial intelligence is implemented through deep learning, and this deep learning technology is rapidly expanding and being applied to areas of creation, judgment, diagnosis, and decision-making that were previously considered human domains. Recently, OpenAI[3], Google[4], and Facebook have competitively introduced large-scale deep learning models[5],

and these models have shown interesting results in content creation through writing, composition, video, and complex knowledge processing. In the case of diagnosis, as medical artificial intelligence, including IBM Watson[6], is spread in the medical field, it is showing the ability to not only diagnose patients' diseases without expert intervention, but also predict the prognosis of the disease and provide health management advice. Artificial intelligence is also being used in the field of law, where optimal judgment and decision-making must be made based on strict logic and considering precedents. In the United States, China, Australia, and Estonia, artificial intelligence has begun to refer to legal judgments, and artificial intelligence is assisting in criminal proceedings or inferring the possibility of recidivism to help judges determine sentence [7].

In this way, in the process of developing artificial intelligence toward the goal of general artificial intelligence (AGI), which transcends specific functions in one field of human intelligence and has overall human-like abilities[8][9], there is discussion about the ethical status that only humans can have. is emerging as a key topic. There is great expectation that superior human-like artificial intelligence can perform beneficial roles on behalf of humans, but on the other hand, there is concern and fear that it may threaten human existence and engage in unethical acts beyond human control. is also getting bigger [10]. Stephen Hawking warned, "The development of full artificial intelligence could mean the end of humanity" [11], and Roman Yampolski, a professor at the University of Louisville's Cybersecurity Institute, said, "AI will definitely harm humans in the future." He also presented a grim outlook: "There is a 99.9% probability that artificial intelligence (AI) will cause humans to become extinct within 100 years" [12].

In addition to raising questions about the safety and ethical risks of artificial intelligence itself, various ethical issues related to the use of artificial intelligence are also being raised. We cannot help but seriously consider the possibility that indiscriminate use of AI, such as the creation of fake news due to deepfakes, discrimination due to AI bias, and invasion of privacy, may cause risks rather than benefit to humans. The World Economic Forum's (WEF) 2024 Global Risk Report selected AI-generated fake news, false information, and side effects of AI technology as the biggest threats facing humanity in the next 10 years[13].

Now, to the extent that ethical awareness itself must be accepted as a subject of engineering, the development of artificial intelligence cannot help but consider both the engineering dimension and the ethical dimension [14]. Therefore, the purpose of this study is to explore areas that need to be ethically considered and to explore challenges that need to be solved in relation to the design, development, and use of artificial intelligence. To this end, we would like to examine the current development status of artificial intelligence technology, suggest areas that need to be ethically considered related to artificial intelligence, and what ethical tasks need to be solved in the future for each area.

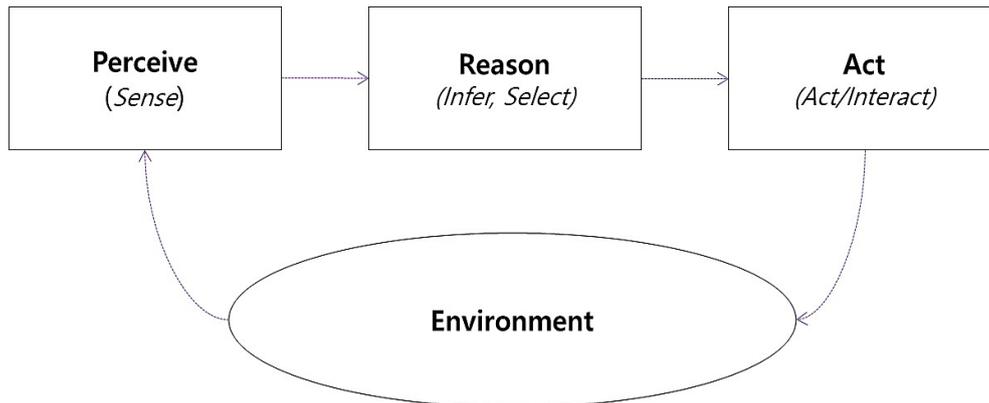
2. Advances in Artificial Intelligence Technology and Ethical Issues

Artificial Intelligence (AI) aims to function in a form most similar to human intelligence [15]. How intelligence is formed, developed, and expressed is a topic that has been explored for a long time in various disciplines, including philosophy, psychology, and computer science. With the advent of computers as calculating machines around 1950, more detailed research on them began. As computers began to automatically perform complex logical reasoning and arithmetic calculations that were believed to be possible only for humans, scientists began to take interest in machines that could act intelligently like humans. If a computer can recognize surrounding information based on complex calculations, use that information to perform a logical thinking process, and then make a rational decision, it is beginning to be thought that it embodies human intelligence and the intelligent behavior that accompanies it. .

Artificial intelligence refers to a field of technology and study that gives computers the ability

to perform these intelligent activities on their own without human intervention [15]. In other words, artificial intelligence refers to the study of computational machines that can achieve given goals while performing the recognition-inference-action process on their own without human intervention. Recently, as artificial intelligence has developed beyond simple automation to a level capable of high-level knowledge processing, artificial intelligence is a science that studies methodologies and theories on the adaptive ability, interaction ability, and autonomy of computational machines in uncertain real-world environments. It is emphasized that it is a field of see <Figure 1>.

Figure 1. Artificial intelligence agent definition concept diagram [16].



Currently, the development of artificial intelligence technology is converging on deep learning [17]. Deep learning is a leading example of cutting-edge artificial intelligence technology that enables computers to perform the recognition-inference-decision-action process without human intervention. As introduced earlier, after Alan Turing proposed the concept of a ‘Turing machine’ in 1936, he wrote a paper titled ‘Computing Machines and Intelligence’ in 1950, predicting that “an era will come in which machines will have intelligence and be able to think like humans.” I predicted it. In line with this, the term ‘artificial intelligence’ was introduced for the first time at the Dartmouth conference held in 1956 led by scholars such as John McCarthy and Marvin Minsky. Afterwards, research on artificial intelligence began in earnest, and in particular, attempts to implement artificial intelligence in the way the human brain processes information also emerged.

In 1957, Frank Rosenblatt proposed the perceptron, which is the basis of today's deep learning models [18]. Perceptron, which was proposed based on a model that presented the principles of how neurons in the human brain work as an artificial neuron, can be viewed as an algorithm that receives multiple input values and outputs a single result value [19]. The human brain can be thought of as transmitting and processing information by forming a network based on electrical and chemical signals exchanged between neurons. Perceptron imitates this, and through this, artificial intelligence can learn as simply as humans. showed it

Afterwards, a multi-layer perceptron capable of more complex logical reasoning and classification tasks was proposed, and it was mathematically proven that such a multi-layer perceptron could be optimally learned through the error backpropagation algorithm proposed by Rumelhart and Hinton in the 1980s, creating an artificial neural network. Research became more active, and deep learning research became an opportunity for successful establishment [20]. As a result, the performance of artificial neural networks began to improve dramatically. In particular, the emergence of deep artificial neural networks, which added more hidden layers to the multilayer perceptron, became a major turning point in artificial intelligence research. In 1997, LeCun introduced deep artificial neural networks, or deep artificial neural networks. Deep learning research gained great popularity after announcing the results of accurately recognizing

handwriting using a learning structure.

However, since the deep learning structure has more hidden layers than the existing neural network, more data is required for accurate learning, and as optimal learning must be performed using such big data, the amount of calculation for learning has become very large. At that time, the development of the Internet made it possible to build big data, making it possible to secure sufficient data for learning. In addition, with the spread of computer performance, especially high-performance multi-core-based graphics processing units (GPUs), the computational problem for optimal learning based on big data has been dramatically improved. Starting with AlexNet in 2012, deep learning models showing excellent performance in the field of image recognition emerged[21], and these quickly spread to text processing, voice processing, and synthesis.

Now, deep learning is making human life convenient and enriching in many fields such as autonomous driving, advertising, chatbots, medicine, and management, and is interacting and coexisting with humans in many areas. Of course, modern deep learning has some limitations in adapting to situations as flexibly as human intelligence, learning various technologies with very little experience, or understanding and generalizing laws with only a small amount of experience to do things that have never been done before. This is a self-evident fact. It is still known that one can only learn well about given correct answers, cannot infer anything other than what one has learned, and the ability to infer laws and theorize from various experiences is an area that still needs to be studied more.

As such, current AI algorithms that have performance equal to or better than that of humans feature intentionally programmed capabilities in only a single, limited domain. It is relatively easy to anticipate the kinds of safety issues that could arise from AI operating only within certain areas. However, dealing with artificial general intelligence (AGI) that operates in a variety of new contexts that cannot be predicted in advance can cause qualitatively different types of problems[14]. Unlike narrow AI systems that excel at specific tasks, AGI aims to possess general cognitive abilities comparable to human intelligence[22]. AGI is artificial intelligence in which AI agents have the ability to learn, perceive, understand, and function fully like humans[23]. In the process of developing and utilizing artificial intelligence with human-like intelligence and abilities, ethical issues regarding artificial intelligence are being raised in various areas of stakeholders. The areas of ethical inquiry related to artificial intelligence that have been discussed in academia, global companies, national governments, and the international community in the series of processes ranging from policy establishment, research and development, and utilization of artificial intelligence to date can be summarized as follows. First, establishing ethical principles for establishing artificial intelligence policy, second, ethical analysis and prediction in artificial intelligence research, third, ethical issues of artificial intelligence developers: content about algorithms, and fourth, ethical issues of artificial intelligence users.

3. Areas of Ethical Inquiry Related to Artificial Intelligence

3.1. Establishing ethical principles for establishing artificial intelligence policy

The first person to attempt an ethical approach to artificial intelligence can be said to be American writer Isaac Asimov. In order to alleviate the fear that robots could harm humans, Asimov presented the 'Three Robotic Laws' to create safe robots through his novel 'I, Robot' in 1950[24]. This law has played an important role in helping many computer engineers set ethical standards for robots and artificial intelligence. However, although these three principles are simple and clear, they have limitations and problems as ethical standards for artificial intelligence due to difficulties such as contradictions, conflicts, and detours in actual application.

Discussions to establish more specific ethical standards for artificial intelligence began in earnest with the Asilomar AI Principles, a joint commitment to AI development announced in 2017[25]. This principle is recognized as a reference point for virtually all ethical frameworks related to artificial intelligence. This is an AI principle adopted at a conference (Beneficial AI 2017) held by the Future of Life Institute, an American non-profit organization, and over 2,000 science and technology figures, including Stephen Hawking, Elon Musk, and Demis Hassabis, left signatures of support. The Asilomar Artificial Intelligence Principles consist of 23 principles in three categories: research issues (5), ethical values (13), and long-term issues (5), and address failures and freedoms that may occur during the AI development process. Responsible behavior for violations was emphasized.

In addition, the Institute of Electrical and Electronics Engineers (IEEE), a leader in disseminating ethical considerations necessary in the development and design of autonomous systems, published a 300-page AI ethics report in 2019, “Ethically Design,” after several years of work. Aligned Design’ was announced[26]. IEEE also serves as an international standards organization, and is working on creating standards in the area of AI ethics under the name of the 'P7000 Series'.

As AI ethics is receiving attention around the world, principles and recommendations on AI ethics for desirable AI development are being announced, mainly by advanced AI countries and international organizations. The EU announced the Trustworthy AI Ethics Guidelines (2019), the OECD announced the AI Principles (2019), UNESCO announced the Artificial Intelligence Ethics Recommendations (2021), and Japan announced the Human-Centered AI Society Principles (2019). and Korea also established AI ethics standards (2020)[25].

However, artificial intelligence technology is a common human problem that affects various fields around the world beyond the level of an individual, company, or country, and ethical principles and standards are needed to monitor and regulate it at the international level. Sam Altman, CEO of OpenAI, warned that “artificial intelligence poses an existential risk to humanity,” and added, “There is no international organization like the International Atomic Energy Agency to monitor and regulate AI issues.” “It is necessary,” he suggested[27]. Pope Francis also called for “the world to work together to adopt a binding international treaty to regulate the development and use of various forms of artificial intelligence” [28]. Therefore, it is necessary for all countries to establish artificial intelligence-related policies and adopt international level artificial intelligence ethical principles and international treaties that can be commonly applied in developing and utilizing artificial intelligence technology. Efforts are required to establish an international governance system for artificial intelligence by forming an international organization that can monitor and regulate it.

3.2. Ethical analysis and prediction in artificial intelligence research

As artificial intelligence technology develops rapidly, artificial intelligence can perform tasks that require specialized knowledge that only people could do until now, such as medicine, law, finance, language, etc., that require high-level cognitive functions of people. I was able to do it.

Let’s look at the area of law as an example. The number of cases of applying artificial intelligence technology in the judicial field, such as case law search and evidence analysis, is increasing. In the case of Estonia, it was announced that a system where artificial intelligence judges will make decisions will be applied to small claims trials with a low possibility of dispute [29]. Estonia is known as a leading e-government country that operates the It is enabling people to carry out more efficient judgments. Since early 2020, China has introduced an online service where an ‘artificial intelligence judge’ assists criminal proceedings through customized Q&A. The Australian Family Court presented a case where artificial intelligence was allowed to present 94 factors and divide a couple's assets in a divorce trial. In this way, attempting a standardized ruling through artificial intelligence is helping humans make a final decision [7].

The criminal justice field is also actively introducing artificial intelligence, especially machine learning algorithms, into the field of crime prediction [30]. The approach to quantifying crime risk and predicting it using algorithms began in the early 1900s, and based on this approach, it has recently been applied to pretrial hearings, parole hearings, probation, disposition decisions, and recidivism predictions [31]. In the United States, some state governments use their own systems (e.g. Virginia, Pennsylvania, Kentucky), but in general, companies or non-profit organizations use crime prediction systems built for special purposes, and investigations are conducted using these. is allowed, and this is also used in sentencing decisions in criminal trials [32]. Representative examples include 'COMPAS' (Florida, Michigan, Wisconsin, Wyoming, New Mexico), the Public Safety Assessment (New Jersey, Arizona, Kentucky, Phoenix, Chicago, Houston), and LSI-R (Delaware), which predict the risk of recidivism among convicted criminals, Colorado, Hawaii, and the Ohio Risk Assessment System [33][34][35].

This approach is a method of automatically deriving rules about risk and likelihood of recidivism using machine learning algorithms from big data based on cases and precedents [36][37], providing evidence-based criminal justice. It serves its purpose well. Typically, machine learning models for predicting the risk of reoffending have been researched and developed to predict the possibility of future crimes by taking factors such as age, gender, criminal history, employment status, and education level as input, and this is used for sentencing and decision-making in criminal justice. It provides the means to carry out the process based on scientific and quantitative methods, while minimizing judgment and decision-making based on human cognitive bias.

An approach that uses statistical model-based machine learning algorithms to detect individual crime risk has shown more accurate crime risk prediction results than experts [38], which can be used to prevent recidivism among individuals with risk factors and It is known to ensure a better effect on rehabilitation protection and lower the overall level of violent crime in the future [39], and is reported to play a significant role in alleviating or adjusting various problems that will arise in the future [40].

However, new ethical issues are arising here. It was expected that machine learning-based artificial intelligence using value-neutral algorithms based on massive data would make objective judgments, but in reality, new problems of discrimination and bias are emerging as artificial intelligence replaces human judgment. For example, there have been many reports of artificial intelligence that has been trained mainly on white male data structurally discriminating against and excluding minorities such as blacks and women, and this has also been reported in the field of criminal justice. As mentioned earlier, the COMPAS system has shown biased decision-making toward certain races in predicting crime, and is facing criticism despite the high efficiency of the system itself [41].

In this way, artificial intelligence can be a useful tool for providing imperfect human prediction, analysis, and judgment capabilities, but as concerns about errors of discrimination and bias are increasing, the morality of the entire process of designing, learning, and implementing artificial intelligence is required. need. At the design stage, the developer must verify morality to ensure that basic moral principles are observed, and morality appropriate to the purpose of development and use must be guaranteed. In this context, new perspectives are being presented on crime prediction technology using machine learning. In particular, it is developing in a direction that is explainable, is fair to all subjects, and even resolves bias in the algorithm itself. In other words, 'Explainable Artificial Intelligence (XAI: explainable Artificial Intelligence)' is being developed as an alternative technology [42]. For example, Wang and his collaborators' research predicted the likelihood of crime using an explainable machine learning algorithm and presented comparative results in terms of prediction performance and fairness when compared to general machine learning algorithms [31].

First, we measured the competitiveness of the machine learning model that can be explained in terms of recidivism prediction performance. We measure the performance of black box-type machine learning models that show high prediction performance for a total of six crimes, including general crime, violent crime, property crime, drug crime, felonies, and misdemeanors, but have no explanation for the prediction, and a machine that can explain this. The performance of learning models was compared. As a result. There was no statistical difference in performance between the two groups. Afterwards, we proposed an evaluation index for the fairness of machine learning models and measured the fairness index of explainable machine learning models. The evaluation index well expressed fairness sensitivity for black/white and male/female attributes, and the possibility of explanation for this was confirmed.

Therefore, for ethical prediction and analysis of future artificial intelligence research, the reasoning process and reasons should be explained so that the results of complex artificial intelligence calculations can be understood in the user's language, so that ethical problems that may arise can be verified and 'explained' to help make moral decisions. Research and development on 'enabled artificial intelligence' technology is required.

3.3. Ethical issues for artificial intelligence developers: algorithms

The roles of AI engineers and researchers come with many responsibilities. The most certain thing is to develop an accurate and reliable algorithm that users can trust. But this is by no means easy. For example, due to various types of human biases such as confirmation bias, gender bias, and anchoring bias, AI technologists and researchers intentionally or unintentionally inject these same kinds of biases into the developed algorithms, especially when using machine learning techniques. There are many[43]. Regarding this, Mittelstadt et al. (2016) point out that algorithms are full of bias that prioritizes certain values and interests over others[44]. In this way, algorithms can be said to be value-driven rather than neutral in that they produce moral consequences, strengthen or weaken ethical principles, and activate or decrease the rights and dignity of stakeholders[45].

Therefore, as with most professions, the desirable behavior of artificial intelligence algorithm developers is often expressed in a code of ethics. These norms generally require members to follow the law, but they also set standards of practice that must be applied when the law is silent or when common sense and professional norms are no longer appropriate [46]. To date, there are countless codes of ethics written specifically for AI development. Currently, nearly 100 codes of ethics exist, guiding developers on how to work[47].

However, while artificial intelligence developers are generally aware of the ethical terrain they must navigate and the moral dilemmas they personally face, they are aware of the problem that resources for ethical guidance and training are limited and inconsistent[48]. There are also significant barriers to ethical practice among AI developers, including the industry's obsession with innovation, narrow scope of technical practice, limited provisions for reflection and dialogue, and incentive structures that prioritize profit and reputation. Mok Kwang-soo (2020) points out that "many of the discussions on artificial intelligence ethics that have been actively presented recently are limited to third-person perspectives and are therefore weak in promoting actual 'ethics realization'." [49].

So far, in discussions on artificial intelligence ethics, there has been a relative lack of discussion on the ethics of artificial intelligence developers. Therefore, along with discussions on ethical principles and specific standards for artificial intelligence developers, the development of practical ethics education is required to ensure that artificial intelligence developers practice ethical behavior. Ethical considerations must fully permeate all technical activities of engineers[50]. In other words, ethics is not simply an additional thing that must be 'added' to the

activities of artificial intelligence developers, but efforts must be made to systematically integrate it with technology. To achieve this, it is necessary to newly establish the concept of engineering ethics, which integrates engineering and ethics into one, and to develop an engineering ethics education system.

3.4. Ethical issues for artificial intelligence users

In order for artificial intelligence technology to be used safely and beneficially, corresponding ethics and ethics education are necessary. We expect AI to provide the correct answer through big data learning. It is about having faith that AI's interpretations and decisions based on large amounts of data are fair and reliable. However, the idea that AI will be as perfect as God may be a human bias. AI is not perfect like God, and rather its biases are as inevitable as human biases. In a 21st century society where diversity is valued, citizens need to interpret AI from various perspectives and accept it as a reference tool for effective problem solving rather than perceiving AI as a perfect information provider or problem solver. Furthermore, the fundamental solution to the AI bias problem needs to be explored in user bias-related education rather than in perfect AI[51].

We also need to ensure that AI is recognized as an entity that enhances human capabilities and can collaborate with humans, rather than completely replacing humans. Humans' excessive dependence on AI, which causes AI addiction, should be avoided, and an environment should be created where AI can be recognized as a facilitator of innovation. As posthuman is predicted, AI that collaborates with humans will emerge as a new humanity[52], and it is time to find ways to coexist with AI[53]. In order for humans and AI to coexist harmoniously, the purpose of using AI must match human values, so human ethical awareness and moral judgment are important in utilizing AI technology[25].

To achieve this, an integrated AI education program is needed that includes both AI education and AI ethics education. In the process of solving real-life problems using artificial intelligence, computational thinking components and artificial intelligence ethics elements should be considered in an integrated manner to strengthen the practice of artificial intelligence ethics along with cultivating computational thinking skills, which is the ultimate goal of artificial intelligence education[54]. In particular, intensive efforts are required to inform users of potential social bias, moral criticism, and risks of AI application in order to increase users' moral judgment[55]. Therefore, efforts are required to establish a content system for artificial intelligence ethics education and integrate it into the moral education curriculum. There is an urgent need to discuss ways for the current elementary and middle school moral education to accept the new content of practical ethics called AI ethics[56].

4. Conclusion

Cars are a very useful means of transportation, but they are also very dangerous tools that can cost lives if an accident occurs. The reason you can safely ride a potentially dangerous car is because you comply with laws and regulations such as the Road Traffic Act, as well as technical safety devices such as brakes. Artificial intelligence is also a very beneficial and convenient tool of civilization, but without the safety device of ethics, it is a 'double-edged sword' that has the risk of threatening human existence and harming human life. Therefore, in order for artificial intelligence to continue to coexist harmoniously with humans, safety measures called ethics are necessary, and it is important to establish laws and systems to implement a safe artificial intelligence ecosystem.

However, no matter how tightly the laws and systems are established, the efforts of stake-

holders involved in the design, learning, and use of artificial intelligence to use artificial intelligence safely with a sense of ethics must be a top priority. However, efforts to resolve ethical issues in artificial intelligence are not keeping up with the rapid pace of development of artificial intelligence. As a result, there are even voices of apocalyptic concerns that artificial intelligence will destroy humanity.

In this context, this study attempted to review the overall area of ethical inquiry related to artificial intelligence and explore what tasks need to be urgently resolved. This needs to be addressed and discussed as an important topic in resolving ethical issues related to artificial intelligence in the future. The areas of ethical inquiry related to artificial intelligence identified through this study were largely set as the establishment of ethical principles, ethical prediction and analysis in artificial intelligence research, artificial intelligence developer ethics, and artificial intelligence user ethics. In addition, key issues that need to be addressed and resolved in each ethical area were presented. In relation to the establishment of ethical principles, the need for principles and standards, conclusion of treaties, and establishment of a cold organization at the international level was suggested. In artificial intelligence research, the need for explainable artificial intelligence technology was presented for ethical prediction and analysis. In artificial intelligence developer ethics, the need to establish the concept of engineering ethics and establish an education system that can integrate engineering technology and ethics was raised. Lastly, in the area of artificial intelligence user ethics, the need to establish a content system for artificial intelligence ethics education that integrates artificial intelligence education and artificial intelligence ethics education and integrate it into the moral and educational curriculum was emphasized.

However, since this study is an exploratory study on the areas of ethical inquiry and tasks related to artificial intelligence and does not discuss specific methodology, it is expected that active discussions on this will take place in the future.

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6. Appendix

6.1. Author's contribution

	Initial name	Contribution
Lead Author	GP	<ul style="list-style-type: none"> -Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/> -Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/>
Corresponding Author*	JB	<ul style="list-style-type: none"> -Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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Analysis of AI Ethics Awareness by Gender, Age, Education Level, and Workplace -Focusing on Korean Police Officers-

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Abstract

Purpose: Artificial intelligence (AI) in Korea is bringing about innovation along with the technological development of global companies such as Samsung Electronics and Hyundai Motors, and the ethics of AI are being dealt with centered on humans through cooperation between the government, academia, and companies. However, the role of the police in cybersecurity threats should also be dealt with very importantly in the development of AI, so this study aimed to analyze the awareness of AI ethics according to the gender, age, education level, and workplace size of police officers.

Method: The data processing of this study was done using the statistical package program SPSS 23.0 Program. According to the purpose of the data analysis, first, frequency analysis was performed to identify general characteristics using the SPSS/PC+23.0 program. Second, a t-Test was performed to find out the difference in awareness of AI ethics according to the gender of police officers. Third, a One Way ANOVA was performed to find out the difference in awareness of AI ethics according to the age and education level of police officers. Fourth, a t-Test and One Way ANOVA were performed to find out the difference in awareness of AI ethics according to the work area and number of employees of police officers.

Results: Korean police officers were fully aware of the 'ethical and legal issues' and 'government responses' of AI, but showed differences in the priority of establishing legal grounds for AI depending on gender and education level, and in the awareness of granting electronic personality depending on the size of the workplace.

Conclusion: Police officers' awareness of AI ethics is essential to securing social trust through fair law enforcement, protection of personal information, clarity of responsibility, and transparent decision-making. AI technology is expected to lead to innovation in all areas of police work, including crime prediction, facial recognition, data analysis, digital forensics, traffic management, and emergency response. Therefore, police officers' awareness of AI ethics explored in this paper will play an important role in the changes in future police work.

Keywords: AI, Ethics, Police Officers, Electronic Personality, Legal Issues

1. Introduction

1.1. Background of the study

Artificial Intelligence (AI) Ethics in Korea AI technology is being developed by global companies such as Samsung Electronics and Hyundai Motors, and the government, academia, and companies are working together to address various ethical issues[1][2][3][4][5]. First, through government-led policies and guidelines, the Korean government announced the 'National AI Ethics Standards' in December 2020 for the ethical use of AI technology. These standards emphasize the principles of human-centered AI, transparency and fairness, safety, and accountability[6].

In addition, the Korean government supports innovation and industrial promotion of AI technology, while also making efforts to build social trust through ethical regulations, and ensuring that AI technology does not infringe on human fundamental rights, thereby respecting human-centered privacy protection, prohibition of discrimination, and autonomy, so that AI can promote social value and contribute to the public interest[7].

In addition, AI ethics in Korea emphasizes transparency and accountability, and is preparing measures to transparently disclose the decision-making process of AI systems and clarify responsibility for malfunctions or unexpected results of AI systems[8][9][10]. And in order to eliminate bias and discrimination that may occur in AI algorithms, fairness is emphasized in the data collection and processing process, and while allowing society to benefit from AI technology, technical, ethical, and legal standards are being established to ensure that AI systems are developed and operated safely[11][12].

However, despite the development of the AI market, cybersecurity threats must be addressed not only to resolve security issues of AI technology, but also to address the role of the police[13][14]. As artificial intelligence (AI) is introduced to police work, AI technology can be used as an important tool for the police to prevent and solve crimes[15], but the ethical aspects of AI technology will be an important analysis of how they are perceived as police officers enforcing the law[16].

Therefore, this study aims to shed light on the current status of Korean police officers' perceptions by analyzing differences in AI ethics according to police officers' gender, age, education level, and workplace size.

1.2. Purpose of the study

When looking at how perceptions of artificial intelligence (AI) differ by gender, age, education level, and workplace size, first, men and women may have different experiences and accessibility in the fields of technology and computer science. Since this is a field where men have traditionally participated more, women may have been less familiar with or less confident about AI in the past, but this gender gap has narrowed due to changes in the times[17]. Second, in terms of technology acceptance due to age differences, younger generations are more likely to be open to technological innovation and change[18]. Younger generations who grew up as digital natives may be more familiar with and have more positive perceptions of AI technology. Third, in terms of technology understanding by education level, people with higher education levels are more likely to have a higher level of understanding of AI technology, and the higher their education level, the more sensitive they are to potential ethical issues and social impacts of AI[19]. Finally, in terms of technology adoption by workplace, AI technology can be more easily adopted in workplaces with many employees and those located in urban areas, so employees working in these workplaces are more likely to view AI positively[20]. The purpose of this study, based on these characteristics, is to explore the perception of AI ethics among Korean police officers by gender, age, education level, and workplace.

2. Methods of the Study

2.1. Study population and sampling methods

In this study, among police officers in the security department as of 2020 who had experience in work related North Korean defectors, 100 trainees in the Police Human Resources Development Institute were surveyed via self-administration method. Among the collected survey questionnaires, 91 were selected as valid samples, excluding those whose answers were incomplete or missing.

Table 1. The general characteristic of the research subjects.

	Description	N (%)	Total
Gender	Male	61 (67.0%)	91
	Female	30 (33.0%)	
Age	20s	7 (7.7%)	91
	30s	28 (30.8%)	
	40s	30 (33.0%)	
	50s or older	26 (28.6%)	
Education Level	High school graduate	14 (15.4%)	91
	Junior college graduate	30 (33.0%)	
	College graduate	43 (47.3%)	
	Graduate school or higher	4 (4.4%)	
Rank	Policemen/women	1 (1.1%)	91
	Senior policemen/women	19 (20.9%)	
	Assistant inspector	18 (19.8%)	
	Inspector	29 (31.9%)	
	Senior inspector	14 (15.4%)	
	Superintendent	10 (11.0%)	
Employment path	General recruitment	75 (82.4%)	91
	Special recruitment	5 (5.5%)	
	Police Academy	2 (2.2%)	
	Police cadet	9 (9.9%)	
	Other	0 (0.0%)	
The total period of working as a police officer	5 years and less	13 (14.3%)	91
	6-10 years	32 (35.2%)	
	11-15 years	13 (14.3%)	
	16-20 years	13 (14.3%)	
	Longer than 20 years	20 (22.0%)	
The period of working at the security department	2 years and less	16 (17.6%)	91
	3-5 years	56 (61.5%)	
	6-10 years	17 (18.7%)	
	Longer than 10 years	2 (2.2%)	
The number of police officers in the organization	10 or less	18 (19.8%)	91
	11 to 15 people	42 (46.2%)	
	15 to 20 people	24 (26.4%)	
	21 or more	7 (7.7%)	
Work location	Tier 1 areas (big cities)	80 (87.9%)	91
	Tier 2 areas (small/medium-sized cities)	11 (12.1%)	
	Tier 3 areas (rural areas)	0 (0.0%)	

2.2. Measuring instrument

The appropriate method for each verification method was chosen to increase the content validity and verify the construct validity of the questionnaire. Content validity was validated

through consultation with relevant experts to adopt survey questions suitable for the purpose of the study.

Table 2. The questions.

	Questions
Q-1	I am aware of the contents related to granting electronic personality to AI.
Q-2	I am aware of the ethical issues in the AI market.
Q-3	I am aware of the priority of establishing legal grounds according to the core sectors of the AI industry.
Q-4	I am aware of the legal issues in the AI market.
Q-5	I am aware of the government's response to AI.

2.3. Data processing and analysis method

The data processing of this study was performed using the statistical package program SPSS 23.0 Program, and statistical verification was performed as follows according to the purpose of data analysis.

First, frequency analysis was performed using the SPSS/PC+23.0 program to identify general characteristics.

Second, t-Test was performed to find out the difference in awareness of AI ethics according to the gender of police officers.

Third, One Way ANOVA was performed to find out the difference in awareness of AI ethics according to the age and education level of police officers.

Fourth, t-Test and One Way ANOVA were performed to find out the difference in awareness of AI ethics according to the work area and number of employees of police officers.

3. Results

3.1. Differences in perception of AI ethics according to police officers' gender, age, education level, work location, and number of employees

Table 3. Differences in perception of AI ethics by gender of police officers.

		N	M	SD	t-value	sig
Q-1	Male	61	2.9180	.55663	1.257	.577
	Female	30	2.7667	.50401		
Q-2	Male	61	3.0492	.58953	.884	.994
	Female	30	2.9333	.58329		
Q-3	Male	61	3.0164	.74144	-.333	.026
	Female	30	3.0667	.52083		
Q-4	Male	61	3.2623	.65579	1.136	.166
	Female	30	3.1000	.60743		
Q-5	Male	61	3.2623	.65579	.894	.253
	Female	30	3.1333	.62881		

Note: A: Male, B: Female.

<Table 3> shows differences in perception of AI ethics by gender of police officers. The analysis results showed that Q-3 was higher for women than for men at the 5% level.

Table 4. Differences in perception of AI ethics by age of police officers.

		N	M	SD	F	sig	post hot
Q-1	20s	7	2.7143	.75593	1.886	.138	
	30s	28	2.7143	.46004			
	40s	30	2.9000	.40258			
	50s and	26	3.0385	.66216			
Q-2	20s	7	2.5714	.53452	2.448	.069	
	30s	28	2.9286	.60422			
	40s	30	3.0333	.41384			
	50s and	26	3.1923	.69393			
Q-3	20s	7	2.5714	.78680	2.736	.058	
	30s	28	2.8929	.62889			
	40s	30	3.0667	.58329			
	50s and	26	3.2692	.72430			
Q-4	20s	7	3.0000	.81650	1.474	.227	
	30s	28	3.1429	.59094			
	40s	30	3.1333	.62881			
	50s and	26	3.4231	.64331			
Q-5	20s	7	3.1429	.69007	1.410	.245	
	30s	28	3.0714	.71640			
	40s	30	3.2000	.55086			
	50s and	26	3.4231	.64331			

Note: A: 20s, B: 30s, C: 40s, D: 50s and above.

<Table 4> shows differences in perception of AI ethics by age of police officers. There appears to be no significant difference in perception of AI ethics by age of police officers.

Table 5. Differences in perception of AI ethics according to police officer's education level.

		N	M	SD	F	sig	post hot
Q-1	High school graduate	14	2.7143	.61125	1.401	.248	
	Junior college graduate	30	2.7667	.50401			
	College graduate	43	2.9767	.46231			
	Graduate school or higher	4	3.0000	1.15470			
Q-2	High school graduate	14	2.7857	.57893	1.867	.141	
	Junior college graduate	30	2.9667	.61495			
	College graduate	43	3.0698	.55185			
	Graduate school or higher	4	3.5000	.57735			
Q-3	High school graduate	14	2.4286	.64621	5.727	.001	B,C,D>A
	Junior college graduate	30	3.0667	.63968			
	College graduate	43	3.1628	.61452			
	Graduate school or higher	4	3.5000	.57735			

Q-4	High school graduate	14	3.0714	.73005	.794	.501
	Junior college graduate	30	3.1333	.57135		
	College graduate	43	3.2791	.59062		
	Graduate school or higher	4	3.5000	1.29099		
Q-5	High school graduate	14	3.0714	.61573	.542	.655
	Junior college graduate	30	3.2000	.66436		
	College graduate	43	3.2558	.65803		
	Graduate school or higher	4	3.5000	.57735		

Note: A: High school graduate, B: Junior college graduate, C: College graduate, D: Graduate school or higher.

<Table 5> shows the difference in awareness of AI ethics according to the educational background of police officers. The analysis results showed that at the 1% level, Q-3 junior college graduates, college graduates, and graduate school graduates were higher than high school graduates.

Table 6. Differences in perception of AI ethics by police officer's work location.

		N	M	SD	t-value	sig
Q-1	Tier 1 areas (big cities)	80	2.8875	.52756	.919	.161
	Tier 2 areas (small/medium-sized cities)	11	2.7273	.64667		
Q-2	Tier 1 areas (big cities)	80	3.0625	.58122	2.312	.516
	Tier 2 areas (small/medium-sized cities)	11	2.6364	.50452		
Q-3	Tier 1 areas (big cities)	80	3.1000	.64827	2.642	.374
	Tier 2 areas (small/medium-sized cities)	11	2.5455	.68755		
Q-4	Tier 1 areas (big cities)	80	3.2500	.60588	1.669	.153
	Tier 2 areas (small/medium-sized cities)	11	2.9091	.83121		
Q-5	Tier 1 areas (big cities)	80	3.2625	.63133	1.719	.730
	Tier 2 areas (small/medium-sized cities)	11	2.9091	.70065		

Note: A: Tier 1 areas (big cities), B: Tier 2 areas (small/medium-sized cities).

<Table 6> shows the differences in police officers' perception of AI ethics based on their work location. It is analyzed that there is no difference in police officers' perception of AI ethics based on their work location.

Table 7. Differences in perception of AI ethics according to the number of police officers in the workplace.

		N	M	SD	F	sig	post hot
Q-1	10 or less	18	2.7222	.57451	5.463	.002	D>A,B,C
	11 to 15 people	42	2.7857	.41530			
	15 to 20 people	24	2.9167	.58359			
	21 or more	7	3.5714	.53452			
Q-2	10 or less	18	2.7778	.64676	3.023	.054	

	11 to 15 people	42	2.9524	.49151			
	15 to 20 people	24	3.1667	.63702			
	21 or more	7	3.4286	.53452			
Q-3	10 or less	18	2.7222	.75190	1.944	.128	
	11 to 15 people	42	3.0476	.58236			
	15 to 20 people	24	3.2083	.65801			
	21 or more	7	3.1429	.89974			
Q-4	10 or less	18	3.0000	.76696	2.215	.092	
	11 to 15 people	42	3.1905	.63392			
	15 to 20 people	24	3.2500	.44233			
	21 or more	7	3.7143	.75593			
Q-5	10 or less	18	3.0556	.63914	.724	.540	
	11 to 15 people	42	3.2143	.68202			
	15 to 20 people	24	3.2917	.55003			
	21 or more	7	3.4286	.78680			

Note: A: 10 or less, B: 11 to 15 people, C: 15 to 20 people, D: 21 or more.

<Table 7> shows the difference in awareness of AI ethics according to the number of police officers in the workplace. The analysis results showed that at the 1% level, Q-1 21 or more people were higher than 10 or fewer, 11 or more to 15 or fewer, and 15 or more to 20 or fewer.

4. Discussion

Currently, the legal basis for the core sectors of the AI industry in Korea is being discussed in terms of responsibility for AI malfunction, AI's legal personality, personal information protection, transparency of the results of AI decision-making, and clarity of data utilization laws[21][22][23].

Korean police officers were aware of the ethical and legal issues in the AI market and the government's response to AI, but there were differences in the priority of establishing the legal basis for the AI industry according to the gender and academic background of the police officers, and in the content related to granting electronic personalities according to the number of employees at the workplace to which the police officers belong.

First, the difference in the recognition of the priority of the legal basis for AI according to the gender and academic background of the police officers can be seen as a difference in technological accessibility and experience, and it seems that the influence of the social expectations and roles that came about as a result was at work. In the past, men were better than women in the field of computer technology[24], but now, female police officers in Korea have a better perception than male police officers. In addition, since laws related to new technologies such as AI belong to specialized knowledge, it is analyzed that the level of education affected information accessibility[25].

And the difference in perception regarding AI electronic personality assignment according to the number of police officers in the workplace seems to be influenced by the positive or negative perception of AI depending on the culture of resistance to innovation and change, and it seems to also affect the introduction and use of AI technology depending on the resources and infrastructure of the workplace.

5. Conclusion

Police officers' understanding of AI ethics is essential because AI technology is increasingly being introduced to more police work[26], and ethical considerations are essential to ensure effective and fair law enforcement[27].

The key is to secure citizen trust through unbiased, accurate, and fair law enforcement, manage data through personal information protection, and establish a social safety net through clarity of responsibility for the use of AI and transparent decision-making.

In the future, police officers will utilize AI algorithms to predict crime patterns through recognition, AI-based facial recognition technology to identify and track suspects from surveillance camera footage, quickly analyze massive amounts of data to derive information and clues necessary for investigations, analyze data in digital forensics, and quickly classify evidence. AI will also analyze surveillance camera footage in real time to detect suspicious behavior or situations, and AI technology will automatically detect traffic violations such as red light violations and speeding through traffic cameras, and optimize traffic flow by analyzing traffic data and real-time traffic data to contribute to traffic management.

Lastly, AI will rapidly make decisions and process data in emergency situations such as crimes and disasters, and the police's emergency response system will also develop innovatively. The police officers' awareness of AI ethics explored in this paper is expected to play a large role in future changes.

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7. Appendix

7.1. Author's contribution

	Initial name	Contribution
Author	SJ	<ul style="list-style-type: none">-Set of concepts <input checked="" type="checkbox"/>-Design <input checked="" type="checkbox"/>-Getting results <input checked="" type="checkbox"/>-Analysis <input checked="" type="checkbox"/>-Make a significant contribution to collection <input checked="" type="checkbox"/>-Final approval of the paper <input checked="" type="checkbox"/>-Corresponding <input checked="" type="checkbox"/>-Play a decisive role in modification <input checked="" type="checkbox"/>-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/>-Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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Creativity and AI: Products of Generative AI and Ethical Issues

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Abstract

Purpose: This study aims to examine ethical issues arising from generative artificial intelligence. Generative artificial intelligence is a field of artificial intelligence that focuses on computer models capable of generating original content. Therefore, the purpose is to clarify the nature of creativity in the output produced by AI, explore the scope of recognition of creativity, and examine ethical issues arising from this.

Method: This study first uses the method of literature review to review various discussions on creativity and AI. Next, it models the scope of ethical discussions on the output of generative AI using the method of development research. Based on this, it presents the developed model to explore the scope of recognition of ethical issues related to the use of generative AI.

Results: The results of this study reveal the following points. The ethical issues that arise from generative AI are generally proposed in the form of a complex matrix. The vertical axis can be arranged to focus on creativity and to arrange elements related to the life cycle of information, from the production of information itself to distribution and consumption. These are represented by elements of copyright, responsibility, false and manipulated information, personal information and personality rights, and misuse of information. The horizontal axis can be arranged to focus on the use of AI and to arrange ethical elements related to it. These are represented by elements such as data theft, labor exploitation, and excessive energy consumption.

Conclusion: The conclusion of this study suggests that the Factors related to creativity and factors related to the use of AI form a matrix and function as a model for exploring ethical issues that should be reviewed in the correlation between creativity and AI. This functions as an ascending model that forms a three-dimensional plane with ethical considerations as the central axis in the operation process of generative artificial intelligence.

Keywords: Artificial Intelligence, Generative AI, Creativity of AI, Intellectual Property, AI Ethics

1. Introduction

Ethical discussions related to intellectual property rights emerged relatively recently. However, these discussions have become important issues, especially with the emergence of generative AI[1]. In particular, these issues have emerged as a topic of interest in studies that seek to establish ethical norms by viewing AI as a moral subject[2], and studies that explore AI's ethical norms through discussions in virtue ethics[3]. Meanwhile, this has led to the emergence of a series of studies that seek ways for AI and humans to collaborate. This has emerged as a series of studies that focus on exploring what kind of creativity the results of AI and human collaboration can have. In order to examine this more analytically, it is necessary to first understand the nature of the output of generative AI. In order to examine the ethical nature of this, we will first analyze the nature of creativity related to ethical aspects. Based on this, we will develop a model of issues related to ethical issues. Through this, we aim to provide a guideline for the production, distribution, and use of AI outputs that pursue ethics.

2. The Nature of the Products of Generative AI

Generative AI refers to AI that has the ability to produce new content as output. As shown by several generative AI cases including ChatGPT and DALLE 2, it can produce text, images, voices, and videos based on requests made through text. Furthermore, the speed at which it produces them is incomparably faster than the speed at which humans have produced them so far. Of course, the level of output has been problematic due to limitations in datasets, but the level of output in areas with sufficient data is very high. Accordingly, the introduction and use of generative AI is gradually expanding. And the level and direction of its development in the future are expected to be key factors in determining the future of humanity. Global technology companies, so-called 'Big Tech,' are also making large-scale investments in generative AI research and development. Among these, OpenAI, well-known as the developer of ChatGPT, is particularly notable in AI research and development. This company, which is currently leading generative AI, declares on its homepage that its research focus is on the development of 'artificial general intelligence (AGI).' In other words, the goal of their research is to implement a 'system that can solve human-level problems.'

What stands out here is the 'human-level' and the standards and extent of problems that AI can handle at that level. There have already been several cases of AI that have shown better abilities than humans in specific areas, such as Google's AlphaGo, but OpenAI's generative AI is relatively free from restrictions on the scope of application. If we look at it this way, the 'human-level problems' at this time will not be limited to any specific or specific problems within a limited area. Rather, in terms of artificial 'intelligence,' it seems that the general tasks that humans can solve intellectually, such as critical thinking, will be set as the target. If we look at it this way, the general AI that OpenAI is setting as the goal of its research and development is an AI that has the ability to think, learn, and create in all given situations, not just specific problems, or research on this. It is almost identical to the existing definition that it is one of the ultimate goals of AI research.

On the other hand, what level will the capabilities of general AI be? To gauge this, we need to refer to the concept of 'GPAIS (General Purpose AI Systems)'. This concept was originally used in the 'AI Act' enacted by the European Union to contain comprehensive regulations on artificial intelligence, but it was redefined and understood as an AI system that performs or can perform various tasks, including those that are not intentionally and specifically trained, as the regulation was judged to be insufficient to clarify the difference from artificial intelligence used for special tasks or limited areas[4].

What this proposal wants to emphasize is that it includes those that are not intentionally and specifically trained. In this respect, GPAIS is not just a tool that produces pre-inputs. Furthermore, unlike existing artificial intelligence with a fixed purpose, it can produce results not only within the level of expectations and predictions similar to humans, but also beyond that level. This kind of result production can be considered a kind of emergent process. The question is whether this emergence is different from that of humans. Of course, we can experience some difference between the two results now, but the difference seems to be gradually and rapidly decreasing. It seems highly likely that the current level is enough to pass the Turing test. Here, if we understand GPAIS and general AI in the same context, the term human level in OpenAI's system that solves human-level problems can also be read as the term human-level.

The similarity of this generative AI model to humans is being intensively examined, especially in the field of art, which can be said to be a unique intellectual or rational ability of humans. Generative AI models enhance the ability of AI to understand or create complex works of art by processing various types of data such as images, audio, and graphics beyond text through multi-mode processing functions. This does not end with simple information processing, but influences human decision-making through the output, which inevitably raises ethical issues. The

advantages of this generative AI output are well known, but certain limitations are also being revealed, and the representative aspects of these are as follows.

First, the problem of the possibility of experiencing artistic sense. Unlike humans, AI cannot be a subject capable of artistic judgment or emotional interpretation. In that sense, the question may be raised as to whether creating art through generative AI is equivalent to pursuing the value of human emotion or emotional expression, which is one of the essential purposes of art. In addition, since AI does not have the ability to make independent decisions on its own, there is a view that the choices made by AI are merely pre-learned content or the result of an algorithm programmed by humans. This means that AI cannot have the original thoughts or intuition necessary for the true process of creating art, and thus, it is a critical stance on the artistic potential of AI.

Second, there is a technological limitation. Although AI technology is developing at every moment, it still shows limitations in generalization ability, abstract thinking, and situational understanding compared to humans. In particular, since it is difficult for AI to perfectly understand or reflect the context or subtle nuances of a work of art when creating an artistic work, there is a view that it is difficult to highly evaluate the level of such AI artwork.

Third, there is the issue of copyright. Since the process of generative AI creating works is learning and combining works previously created by humans, it is also true that the results of the process may partially infringe on the copyright of the original works. As mentioned above, there are many limitations and concerns regarding the artistic potential of generative AI, but in a reality where the application of AI technology is becoming increasingly common, exploring the artistic potential of AI technology can be a meaningful discussion.

In particular, ethical issues related to the output of generative AI are the use of copyrighted works in the AI learning process, legal protection of AI products, and liability issues in case of violation of ethical regulations of AI products. In particular, many copyrighted works are used in the process of collecting and processing data for AI learning, and this is becoming a serious problem in that they can be utilized without the consent of the copyright holder.

Meanwhile, there are two areas that need to be reviewed in detail, separate from the above review items. One is related to creativity. AI learns based on data, and that data comes from works created by humans. Therefore, there is a view that the art created by AI is fundamentally based on past data and works, and that this limits the creation of completely new ideas or styles by AI. Of course, this criticism is also difficult to escape from the counterargument that art begins with imitation or that there is nothing completely new in the world, so it is difficult to completely distinguish between AI creation and human creation.

Nevertheless, this is being approached analytically in that new outputs can be created through collaboration between humans and AI. Research exploring ways to expand human creativity through AI is exploring ways to utilize AI as a tool for human collaboration[5][6], while there is research analyzing the role of human review on creative outputs[7]. In addition to these series of studies, there is research that aims for collaboration between humans and AI but presents conditions related to it[8].

Second, it is related to artistic meaning. The meaning of artistic activity can only be evaluated through the connection with the human world such as human emotions, experiences, and social contexts, but if AI creations lack connectivity with human society, the artistic meaning of such creations will inevitably be limited. In other words, even if AI imitates the creation of a work of art, it is difficult for anyone to be certain whether the depth or meaning of the work can replace the social awareness, philosophical understanding (worldview), originality, and emotional passion of a human artist. However, in relation to this, it is necessary to examine discussions that examine creativity itself in relation to art. Among these, there are studies that examine the

human intellectual aspects reflected by AI[9], and studies that approach this from a learning perspective at the student level[10]. While these studies have the viewpoint that creativity produced by AI is nothing more than artificial creativity[11], there are also studies that approach it from the perspective of potential in terms of innovation and progress[12][13][14].

3. Analysis of the Nature of Creativity in Relation to Ethical Aspects

When issues related to creativity are understood in connection with AI, they are also examined in terms of media or culture[15]. This discussion is analyzed as the social construction of creativity based on AI[16]. Therefore, the creativity of AI is understood in relation to the human nature that it reflects[17].

The main laws of creativity were stated before scientific research began. In particular, in the statement of the position on creation and imitation related to art, Plato viewed creative activities as a gift of divine inspiration given by the whisper of the Muse, not as a result of rational analysis. Aristotle, who systematized logic, on the contrary, emphasized the methodological, analytical, and rational nature of all works, and attempted to understand creativity in this context. Since then, various studies on creativity have tended to emphasize one of the contrasting views of inspiration and rationality, as in the case of these two scholars.

Various approaches to creativity can be broadly classified into the following six categories. First, there is the psychometric approach. This method aims to measure creativity by creating a test that can measure creativity with a written test in the same order as the initial intelligence test production process. This approach tends to use creativity measurement tools that are highly correlated with intelligence. In addition, research has been conducted on the reliability and validity of creativity tests as standardized psychological measurement tools. The results of these studies show that creativity measurement tools are reliable in that they show relatively consistent measurement values over time, but their validity, which guarantees that the tools truly measure creativity, has not yet been verified at a significant level.

Second, there is a cognitive and developmental psychological approach. This method seeks to explain the creative thinking process and its level by utilizing theories and structures established to explain general thinking processes. This is also used in conjunction with methods that attempt direct research on the thinking processes of creative individuals. Research using this cognitive approach that focuses on people and thinking processes suggests that creative thinking is not fundamentally different from non-creative cognitive activities in terms of basic operational processes.

Third, there is research on personality traits and motivation. This study assumes that certain conditions must be met in order to achieve outstanding achievements in any field. Therefore, this study emphasizes that the characteristics of people who have achieved success in their field are independence, self-confidence, strong ambition, easy access to unconscious processes, sensitive and unconventional thinking, and strong commitment to tasks, and that these may be personality traits that appear because they have succeeded in creative work rather than the cause of their success in that field.

Fourth, there is the socio-historical study of creativity. This study is a method of conducting research in a way that intentionally avoids the cognitive and personality aspects of an individual's psychology in order to verify nominal hypotheses about human behavior, and it uses facts about creative individuals as data and statistically analyzes the data. The results of this research include research on the most creative period and age in life, research on the educational methods of creative artists, and research that seeks to reveal that historically important discoveries were made by the creativity of specific people in specific periods.

Fifth, there is the neurobiological perspective. This is an attempt to analyze the outstanding achievements of some people through a neuroanatomical approach, as techniques for measuring the structure and function of the nervous system and observing the blood circulation process have developed. Through this perspective, it has been revealed that creative people show a special state of arousal in the cerebral cortex, and through research on people with brain damage, it has been found that the right hemisphere of the brain plays an important role in creative activities. In addition, from a neurobiological perspective, creativity is discussed through evolutionary concepts such as occurrence, selection, fixation, mutation, and transfer. Sixth, there is the physics or systems theory perspective. This is an attempt to explain phenomena related to creativity by citing the chaos theory that has recently emerged in physics and systems theory to explain natural phenomena. In this perspective, the tendency of behavior in which a non-linear system sometimes changes in an unpredictable way is called chaotic dynamics, and this is understood as creativity. If there is a certain distance between the problem-solving process that proceeds step by step according to rational or logical procedures and the creative process, the interpretation of chaotic dynamics as a typical form of creativity has certain implications in the area related to the theory of moral development through dilemmas. Accordingly, the integration of many mutually contradictory and dialectical elements in the creator's personal and cognitive aspects through an open and dynamic system becomes an important way to explain creativity.

4. A Model of Relationship of Ethical Direction between the Product of Generative AI and Ethical Measurement Level

A model of the Relationship of Ethical Direction between the Product of Generative AI and Ethical Measurement Level can be presented through a three-dimensional surface graph. One axis can focus on creativity and arrange elements related to the life cycle of information from the production of information itself through distribution to consumption. These are represented by elements of copyright, responsibility, false and manipulated information, personal information and personality rights, and misuse of information. The other axis can focus on the use of AI and arrange ethical elements related to it. These are represented by elements such as data theft, labor exploitation, and energy overconsumption.

Table 1. Human-AI mutual recognition based on relationship, $f(z)=f(x3+y3)$.

		Axis X / Use of AI and ethical elements / accumulation		
		Data theft n=1	Labor exploitation n=2	Energy consumption n=3
Axis Y / Production of Generative AI / Accumulation	Copyright n=1	1+1=2	8+1=9	27+1=28
	Responsibility n=2	1+8=9	8+8=16	27+8=35
	False and manipulated information n=3	1+27=28	8+27=35	27+27=54
	Personal information and personality rights n=4	1+64=65	8+64=72	27+64=91
	Misuse of information n=5	1+125=126	8+125=133	27+125=152

At this point, this research would like to examine three types of ethical issues related to the output of generative AI.

First, there are ethical issues related to the data collection utilized by AI. Copyright disputes over AI training data are representative examples of this. The copyright dispute between the New York Times and Open AI in 2023 provides a concrete example.

The New York Times sued Microsoft and OPEN AI, claiming that millions of articles published by the company were used to train automated chatbots that compete with news media. At the time, it mentioned potential losses to the New York Times brand due to the hallucination phenomenon, and claimed that Open AI and Microsoft were creating substitutes that steal customers with their own content obtained without fair compensation.

In response, OPEN AI argued that training AI models with publicly available Internet data constitutes fair use, and responded that this was a problem caused by the regurgitation phenomenon in which Chat GPT simply outputs the information it learned as an answer, and that it had taken measures to prevent this. At the same time, since AI learns all of humanity's knowledge, data from specific fields is only a very small piece of the whole. It emphasized that a single data source, including the New York Times, does not account for a large portion of the model's intended learning. These discussions converge on the fact that an ethical approach based on a technical understanding of data mining performed by AI is necessary. In addition, it reveals that the problem of intellectual property rights infringement caused by AI should be actively addressed.

In relation to this discussion, if OPEN AI took the content of the New York Times and used it to create an article, it would be a copyright infringement. However, if it used it to learn linguistic expressions, facts, etc., it would be judged as non-expressive use and could be considered fair use. Here, non-expressive use means using it for functional purposes such as information analysis, research, and learning without using the expressiveness of the work.

This function implies the need for ethical discussions related to text mining and data mining and the composition of legal provisions based on them [18]. Discussions on the scope of large-scale data collection work such as web crawling that our society can accept need to be based on ethical values [19].

Second, there is the problem of labor exploitation for the use of AI. AI learns AI models based on the results of labor-intensive efforts of a significant number of people. In this respect, efforts to develop algorithms are based on human judgment and editing. This data annotation work increases the possibility of digital labor exploitation in the AI era. In particular, the work of classifying and entering AI's massive raw data is essential for AI learning, which can lead to the problem of using workers in underdeveloped countries at low wages. For example, AI technology, which is the basis of machine learning, already has the ability to understand context and write sentences at a human level. However, since it uses the learned data as is, it can cause problems such as describing violent, sexist, or racist remarks as they are. To solve this, preprocessing work such as labeling work must be performed before AI learning. Labeling work is the work of selecting violent or negative data or text from a dataset where massive data has been accumulated so that the content can be filtered out. The number of words collected through machine learning reaches hundreds of billions, and there are many complex and sensitive elements, so it is impossible to filter them all out with automated tools, so large-scale manual work is essential. In the process of outsourcing this, the issue of exploitation of workers in underdeveloped countries arises, and this is the focus of the current discussion.

In relation to this, we should capture implications from the results of studies that provide a direction for understanding this from the perspective of platform labor and studies that explore problems arising from digital labor [20]. AI developed to help people still requires human costs,

and in order to implement ethical AI, the human rights and treatment of workers performing the work should be prioritized[21].

Third, there is an ethical issue related to energy consumption caused by AI. The development of AI is creating an unexpected problem. This is excessive electricity consumption and the resulting carbon emissions. In particular, the initial deep learning process of AI models and the process of creating images consumes more electricity than expected. In a situation where electricity consumption in the digital sector is already considerable, AI is taking up a significant portion of it, creating new environmental problems[22].

This is expected to affect future energy policies. It is the expansion of nuclear power plants and the promotion of renewable energy. Ultimately, this may be a good policy direction, but the reality is that it is difficult to reduce carbon emissions themselves. It is necessary to review the new electricity consumption problem that humanity is facing in relation to AI. Since carbon emissions are excessively high and it is difficult to manage the environment, these problems will also affect companies' ESG management.

The time when the most electricity is consumed is when the initial AI is used for deep learning. For example, the amount of electricity required to learn the 'large language model', which is the core technology of Chat GPT, is linked to a proportional amount of carbon emissions. The problem is that the size of AI models is expected to increase in the future, and as a result, electricity consumption will inevitably increase.

In addition, the recent overuse of generative AI images is accelerating this trend. Users often make various demands to test AI and watch how it responds. When creating images, they make difficult demands or make continuous demands and continue to draw pictures. In this way, it is very common for 5 to 6 pictures to be created in succession.

When requesting meaningless and worthless pictures, energy is consumed for each image. Therefore, even though the user only asked to draw a few pictures as a joke, the equivalent amount of electricity was consumed in an instant. This demand can be said to be made to find AI's blind spots and mistakes, make people laugh, and increase followers. It may be fun for individuals, but it increases electricity consumption and carbon emissions.

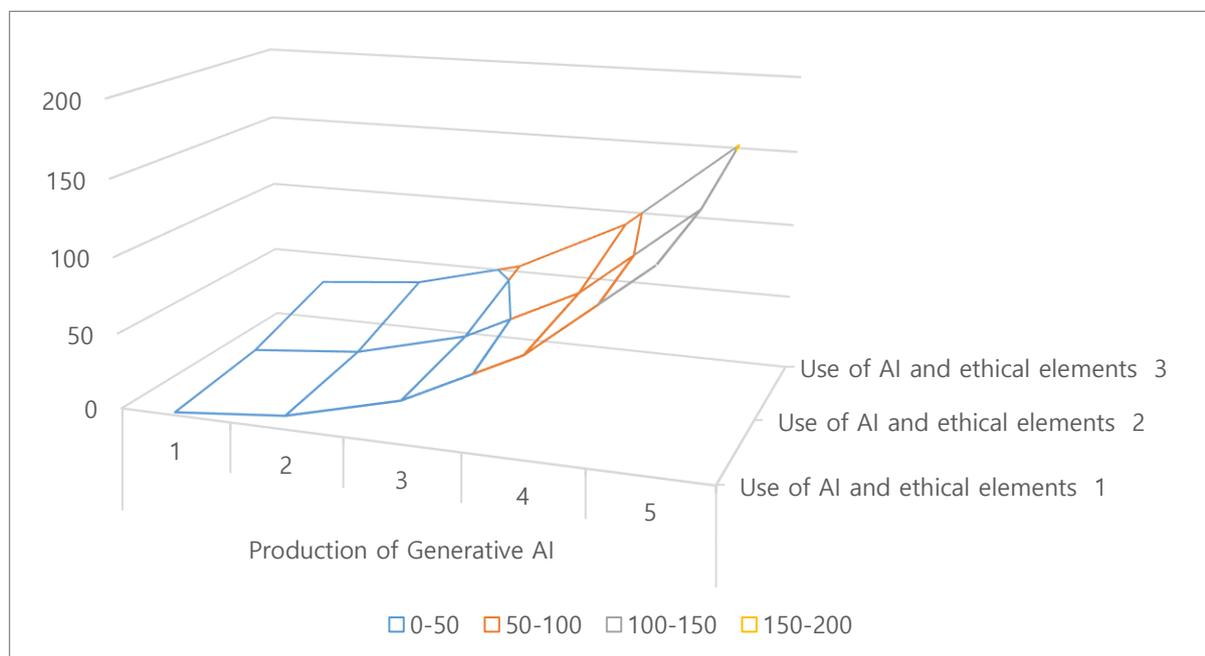
The problem is that users do not notice this excessive consumption of electricity. For example, in the middle of summer, many people worry about using air conditioners because they know that air conditioners consume a lot of electricity. However, when using AI, this feeling is almost absent, and rather, it feels enjoyable. Therefore, users continue to do other tasks. In fact, this kind of power consumption by AI causes a kind of optical illusion. This energy consumption by AI is understood from the perspective of sustainable computing, and is also approached from the perspective of energy policy related to Deep Learning[23].

Putting all of this together, The function of each element in the diagram corresponds to the cumulative cube of each value. And that value is the sum of the x-axis value and the y-axis value. The reason for setting the cube is to symbolically represent that the value pursued by AI-based Ethics grows exponentially more than Metcalfe's law, which is the traditional standard for calculating the value of the network.

The variable values of the function are set arbitrarily, and are set to be expressed as a cube in order to symbolically represent the orthogonal relationship between the two variables. At this time, the correlation coefficient is set arbitrarily in the process conditions, so a process of revealing the correlation through more elaborate research is needed in the future. At this time, it will be necessary to focus on research on whether the variable itself is appropriate, and research on the function that explains the correlation between the variable and other variables.

And by evaluating the performance of these two axes from an ethical perspective, the results can be represented as a surface graph. This is as shown in the example in <Figure 1>.

Figure 1. Relationship of ethical direction between the product of generative AI and ethical measurement level.



This discussion can be addressed especially in the context of Intellectual Property. For example, discussions on intellectual property rights for AI outputs can be widely used in issues related to data mining[24], problems related to AI outputs using employees[25], raising questions about intellectual property rights related to AI outputs[26], legal exploration of points where AI and intellectual property rights interfere with each other[27], efforts to protect intellectual property rights using AI-based cybersecurity technology[28], exploration of the status of AI as property rights itself[29], exploration of intellectual property rights in structures related to data communication[30], etc.

This graph means the following. First, Products of Generative AI can be analyzed in a very complex and diverse manner. Its specific aspects can be presented in various forms, and there are various criteria for classifying it according to the development of technology and society. However, if we look at the current situation, it can be classified into a certain type, and this study presents it by classifying it into the five types above. Second, in relation to Generative AI, there are ethical aspects that should be considered with special focus, in addition to general ethical issues. These can be classified into the three types presented above. These topics are issues unique to Generative AI, but also issues related to important common values of human society, such as the environment, economy, society, politics, and labor. Third, these issues do not exist separately from each other, but have the characteristic of being analyzed as orthogonal in statistical analysis while accumulating and influencing each other. Therefore, as each of these issues deepens quantitatively and qualitatively, we can find the characteristic of increasing the importance of ethical aspects.

5. Conclusion

Generative AI presents the possibility of becoming a platform that can be used in various fields related to human intellectual activities. However, it is necessary to first examine whether generative AI itself is suitable for solving various problems in human life by producing valuable

intellectual results. Next, it is necessary to examine whether users know how to effectively utilize generative AI. Finally, it is necessary to examine the interaction that the output of such generative AI has with humans. The factors related to creativity and factors related to the use of AI presented in this study form a matrix and function as a model that explores ethical issues that should be reviewed in the correlation between creativity and AI. This can provide a direction for the production, distribution, and use of AI outputs that aim for ethics by functioning as an ascending model that forms a three-dimensional plane centered on ethical considerations in the operation process of generative AI.

Meanwhile, the approach to solving these problems requires not only an individual ethical approach but also a social ethical approach. A social ethical approach is an attempt to find ethical solutions to macroscopic and structural problems that cannot be solved or are difficult to solve through individual moral practices alone. This is solved through public administration, policy approaches, political approaches, laws, and institutional approaches to ensure ethical practices. In particular, it is necessary to conduct ethical reviews on Products of Generative AI and conduct prior impact assessments that socially construct the direction of utilization of the technology, establish laws and systems to implement this, secure and more actively utilize social and public hearing procedures to secure more social consensus, and form a consultative body among policy entities that establish, decide, and execute policies related to Generative AI to jointly respond.

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7. Appendix

7.1. Author's contribution

	Initial name	Contribution
Author	HK	<ul style="list-style-type: none">-Set of concepts <input checked="" type="checkbox"/>-Design <input checked="" type="checkbox"/>-Getting results <input checked="" type="checkbox"/>-Analysis <input checked="" type="checkbox"/>-Make a significant contribution to collection <input checked="" type="checkbox"/>-Final approval of the paper <input checked="" type="checkbox"/>-Corresponding <input checked="" type="checkbox"/>-Play a decisive role in modification <input checked="" type="checkbox"/>-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/>-Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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Exploring Innovative Teaching Methods in University Major Courses through the Synergy of AI and HI

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Abstract

Purpose: The purpose of this study is to explore innovative teaching methods to enhance the effectiveness of university major courses which is “Service interview practice II” through the synergy between Artificial Intelligence (AI) and Human Intelligence (HI). To achieve this, a quality management system for the curriculum was established based on the ADDIE model, and the direction for curriculum improvement was presented through learner needs analysis and the setting of learning objectives. The study aims to contribute to the development of learner-centered curricula by effectively utilizing AI technologies.

Method: This research was conducted by analyzing a course that took place over one semester. Following the ADDIE model, the course syllabus was reviewed, and improvement points were derived based on student evaluations. The researcher utilized AI tools to generate course plans and assessment criteria, collecting various responses in the process to ultimately select the most suitable outcomes. This methodology facilitated a collaborative approach between AI and HI.

Results: The analysis of the course syllabus revealed that overall course objectives, as well as the concepts of coaching by instructors, peer coaching, and self-coaching, were clearly articulated, and assessment criteria were strengthened. Notably, the introduction of results-oriented goal-setting allowed students to conduct self-assessments after midterm exams through discussions with instructors, thereby establishing a framework to monitor learner progress. The assessment methods were divided into external and internal evaluations, providing a foundation for more systematic and specific feedback.

Conclusion: This study emphasizes the need for continuous enhancement of teaching effectiveness through collaboration between AI and HI. It particularly suggests that the design of major courses should enable learners to acquire competency-based skills, highlighting the necessity for the development and improvement of diverse teaching methods. Future research should seek ways to improve classes by leveraging the various functionalities of AI and expanding the possibilities of generative AI. These efforts will ultimately contribute to enhancing the quality of higher education.

Keywords: Artificial Intelligence(AI), Human Intelligence(HI), Learner-Centered Curriculum, ADDIE Model, Competency-Based Skills

1. Introduction

The curriculum of each university necessitates a cyclical quality management system that encompasses inputs, processes, and outputs. This is imperative as each institution embodies its distinct educational objectives, goals, and competency frameworks, which guide the formulation of academic, general, and extracurricular curricula. To effectively manage the quality of university curricula, the ADDIE model—an instructional design framework comprising planning, design, development, implementation, and evaluation—has been extensively employed. This model encompasses activities within the analysis and design [1].

The Airline Service Management major began as a degree program at a four-year university for the first time in 2003, but there is a lack of research on class improvement according to the characteristics of each major subject[2]. Meanwhile, innovative teaching methods that allow students to actively participate in classes and achieve self-directed learning are hot topics in university education these days[2]. Therefore, it is necessary to develop airline service management major courses using innovative teaching methods so that students can strengthen their capabilities through self-directed learning. This study seeks to improve the 'Service Interview Practice II' class, a representative subject that strengthens practical skills through self-directed learning by utilizing major knowledge learned in lower grades of major subjects. To improve classes, the ADDIE model, which is most commonly applied to classes, will be applied and analyzed to derive improvements.

The method of deriving improvements for the course involves the interaction between the rapidly advancing artificial intelligence technology of recent years and the human intelligence of the instructor in this study, allowing for continuous questioning to obtain diverse answers. This is because many previous studies support the synergy effect of HI and AI[3][4][5]. Subsequently, a collaborative approach between AI and human intelligence will be utilized to identify areas necessitating modification based on the instructor's insights and evaluations collected from mid-term and final assessments. AI tools will then be employed to explore potential enhancements, which include the design of instructional methods, selection of instructional media, and development of assessment strategies.

Through such practical research, it is possible to actively utilize artificial intelligence technologies in specialized courses to enhance students' learning efficiency and create learner-centered curricula[6][7]. Additionally, the interaction between artificial intelligence and human intelligence can facilitate the development of novel learning methods and assessment strategies, thereby improving educational outcomes [3].

2. Research Methodology and Development Process

This study analyzes the "Service interview practice II" course conducted for fourth graders in the first semester of the 2022 school year based on the ADDIE model. The researcher professor, a human intelligence (hereinafter referred to as HI), analyzes the course syllabus based on the ADDIE model and identifies areas for improvement in course management based on student course evaluations. Subsequently, HI utilizes a generative AI tool to obtain responses to various questions regarding the course syllabus and assessment criteria. From these responses, HI selects the most suitable outcome as the final result.

A lesson plan is a communication document between teachers and students that includes the purpose, content, evaluation, and schedule of the lesson[8], and it is mainly divided into basic information of the subject and detailed information of the lesson plan[1][8][9][10]. In particular, the detailed information section of the lesson plan should provide enough detailed information about the lesson, such as "lesson objectives, hourly lesson contents, textbooks and references, assignments, grade evaluation methods and standards, etc.[10][11]", and emphasize that it should be organized into lesson objectives, teaching strategies, and lesson contents through professional lesson design[12][13][14].

The ADDIE instructional design model is one of the most widely used frameworks for the process, procedures, and guidelines of instructional design. The ADDIE model consists of the analysis and design stages[15][16].

The analysis stage includes four key activities: needs assessment, task analysis, learner analysis, and environmental analysis. The needs assessment should cover the course overview, course objectives, and weekly learning objectives. The task analysis determines the weekly instructional content. The learner analysis adjusts the difficulty and amount of weekly content,

while the task analysis, learner analysis, and environmental analysis inform the selection of weekly instructional methods.

The design stage involves three main activities: instructional method design, instructional media design, and assessment design. The instructional method design specifies the weekly instructional methods, the instructional media design determines the instructional media and materials, and the assessment design outlines the assessment methods and tools, including the formative assessment for each week [1].

HI and faculty, who have experience teaching all of these courses, apply and analyze the syllabus analysis tools of the ADDIE model to their major course, Service Interviewing Practice II. The direction of supplementation is to strengthen students' competencies. This is because the current direction of university education is focused on strengthening students' competencies [17][18][19]. Accordingly, HI asks questions about how AI tools can be applied to improve, and based on the answers, adopts the opinion that this is the best answer for improving classes. The results of HI's analysis of the Service Interview Practice II subject using the class analysis tool (metrics by category) applying the ADDIE model are as follows.

2.1. Step 1: HI applies the ADDIE model to analyze lessons using the class analysis tool (categorical metrics)

At this stage, each researcher judged the suitability of each analysis area for the lesson plan analysis tool (metrics by category) of the ADDIE model on a scale of 3 (high) - 2 (middle) - 1 (low). Afterwards, the agenda with different results was discussed and a final agreement was reached. Result are shown in the following <Table 1>.

Table 1. Analysis result.

Analytics area	Detail area	Suitability*	Analysis criteria
Higher category	Lower category	Axis categories	Analysis content
Lesson objectives	Specificity of statements (Generalization)	2 (of 2)	Whether the course objectives are generalized and the weekly lesson (learning) objectives are stated with specificity.
	Appropriate lesson objectives for each class	2 (of 2)	Whether the appropriate chronological objectives are stated based on what you need to learn.
	Achievable objectives for learners	1 (lower)	Whether the objectives are stated in a way that is learner is achievable given the nature and level of the set to student.
Lesson content	Selection and organization of necessary content	3 (top)	Whether the selected and organized learning content (related information and knowledge) is suitable for achieving the course objectives.
	Relevant learner performances related to objectives	3 (top)	Whether the selected and organized learning activities (performances) are appropriate for achieving the course objectives.
	Proper sequencing of learning content	3 (top)	Whether the selected learning content (activities) is addressed in the correct order, considering the sequence.
Learner	Consideration of learners' needs	2 (of 2)	Whether choices in learning content and activities are provided, considering learners' needs and requirements.
	Adjustment of difficulty based on understanding	2 (of 2)	Whether the difficulty level is adjusted considering the characteristics and understanding levels of the learners.

	Adjustment of lesson volume according to learning abilities	2 (of 2)	Whether appropriate learning volume is provided, considering the abilities and levels of the learners
Teaching method	Selection and application of appropriate teaching models	3 (top)	Whether a variety of appropriate teaching models are selected and applied to achieve course objectives
	Planning teaching strategies that provide ample learning experiences	2 (of 2)	Whether sufficient and meaningful learning experiences are designed and provided to achieve course objectives
	Planning effective verbal and non-verbal teaching strategies	2 (of 2)	Whether effective verbal and non-verbal teaching strategies are planned to meet course objectives
Teaching media	Effective delivery and understanding of content	2 (of 2)	Whether teaching media and materials are designed or selected for effective delivery and understanding of content
	Encouraging learner participation (interaction, communication)	2 (of 2)	Whether teaching media and materials are designed or selected to encourage active participation, interaction, and communication among learners
	Stimulating and expanding learners' thinking	2 (of 2)	Whether teaching media and materials are designed or selected to stimulate and expand learners' thinking
	Engaging and maintaining learners' interest and attention	2 (of 2)	Whether teaching media and materials are designed or selected to engage and maintain learners' interest and attention
Evaluation methods	Methods and tools for assessing goal achievement	2 (of 2)	Whether methods and tools are designed or selected to assess the achievement of learning objectives effectively
	Clarity (objectivity) of evaluation criteria (scoring criteria)	2 (of 2)	Whether evaluation criteria (scoring criteria) are planned clearly and objectively and communicated to learners
	Fairness in processing and utilizing evaluation results	2 (of 2)	Whether the processing and utilization of evaluation results are planned fairly and communicated to learners

Note: *as determined by HI.

2.2. Step 2: Improvement plan for classes based on learner feedback from midterm and final exam evaluations

At this stage, the researcher discussed what needed to be supplemented in relation to the descriptive curriculum evaluation items for the midterm and final exams of the students who participated in this class.

2.2.1. Midterm lesson improvement plan

Based on student feedback from the midterm course evaluation for this course, here are some areas for improvement.

First, the subcategory of "instructional media" needs to be clarified in terms of "effective delivery and understanding of content". To analyze this category, we looked at "whether the instructional media and materials are designed or selected for effective delivery and comprehension of the course content". This course is taught in a flipped learning format during a three-hour class period. Due to the nature of the subject, it is important to develop one's capabilities through self-directed activities. Accordingly, flipped learning was applied as a learning method [20][21][22]. The first hour of the class is a pre-produced online video lecture, and the second hour is a face-to-face mock interview. In this case, the length of the pre-made videos sometimes

exceeded 50 minutes. We believe that it is necessary to redesign the course materials and organize the videos into 30 minutes + 20 minutes or 20 minutes + 30 minutes. In this section, we will compare the results of generative AI to find out what is the best way to deliver the lesson to learners.

Second, instructors provide feedback on learners' individual assignments for each parking. HI give learners two to three days to submit their assignments because it takes a few days for learners to watch the video and submit their work. However, sometimes, HI don't have enough physical time to provide sufficient feedback to all learners because all learners' assignments are submitted within a day or two. To maintain interaction with students, instructors can use the following reminders: "Mark questions you must receive instructor feedback on" and "The instructor provides feedback to learners at least once per question."

Third, as a complement to the subcategory of "Teaching Methods," "Plan teaching strategies to provide sufficient learning experience," It was pointed out that in face-to-face mock interviews, there were too many student interviewers, making it difficult for applicants to make eye contact. Therefore, students who act as interviewers should be divided into two groups: those who sit in the actual interviewer's seat and those who sit in a separate seat to evaluate applicants and provide feedback.

2.2.2. Final exam lesson improvement plan

First, as a complementary method to the subcategory content of "classroom security", which is to encourage learner participation (interaction, communication), learners participate in all three roles (candidate, interviewer, and waiting group), which is time-consuming if all student interviewers give verbal feedback during the interviewer activity. Therefore, the instructor should arrange in advance to utilize online tools (e.g., Quizn[23], Padlet[24], etc.) for the student interviewers to provide detailed feedback in writing.

Second, as a complement to the subcategory content of "Teaching Methods," which is about attracting and maintaining learners' interest and attention, it is necessary to divide learners into "interviewer-questioner-testee-feedback-giver" roles during the waiting group activity, and part of the peer assessment score for the activity part should be reflected in the grade.

Third, keep the candidate's mock interview in focus when the camera captures it.

Fourth, as a complement to the "Stimulating and expanding learners' thinking" subcategory, in the case of discussion interviews, learners check the discussion evaluation sheet after the discussion to see what they should pay attention to. Afterward, give them time to share their impressions with their teammates

2.3. Step 3: HI and AI collaborate to improve lessons

HI determined that results of 2 or less in the syllabus analysis tool (categorical matrix) need improvement. The process involves HI asking Text AI questions about items scoring 2 or lower. If the first question doesn't lead HI in the direction it wants to go, HI continues to ask questions with different prompts. Answers in the direction desired by HI are written in italics and reflected in the results.

1) The answer obtained when HI asked "wrtn[25], Chat GPT[26]." about "lesson objectives"

The objectives (goals) are detailed and specific and describe what students will get out of the lesson. clearly illustrates the learning experience. (omitted) The lesson objectives are currently itemized. You can summarize them as follows to make it easier to see the objectives for the entire lesson at a glance.

Overall class goal: To improve the working knowledge, communication skills, and self-reflective abilities of fourth-year hospitality management majors to interview for positions in the aviation and hospitality industries. You can add descriptions of the specific modalities and learning outcomes of faculty coaching, peer coaching, and self-coaching. For example, you can describe how each coaching approach works and the benefits to students.

The pre-made theory videos (Pre-Class) and post-class learning are also mentioned in detail in the objectives, but you could explain what exactly they cover. (omitted) Applying some complementary suggestions would make it easier for students to understand.

2) Here are the answers we came up with by asking wrtn & chat GPT questions about "learners," "teaching methods," and "mediums. To understand the concepts of coaching, learner self-coaching, and applying them effectively in this course, HI asked Luton questions to define the concepts.

(1) What are some ways learners can improve through self-coaching? There are many ways learners can improve through self-coaching.

- Set goals: Set specific, short-, medium-, and long-term goals for your personal development. Setting goals gives you a sense of purpose and helps you plan and execute.

Evaluate yourself: Consider your strengths, weaknesses, possibilities, and individual circumstances to continually evaluate and give feedback. This will give you a clearer sense of where you are and help you find ways to improve. (omitted) Join a study group: Join a study group to help and support each other. (omitted) Manage your schedule: Use your time effectively and manage your schedule.(omitted)

- Create and execute a plan: Make a plan to achieve your learning goals and stick to it. (omitted) Motivate yourself: Boost your self-esteem, self-respect, and motivation to strengthen your commitment to learning and maintain a healthy mental state.

- Diverse experiences: Get involved in real-world work or social activities to build problem-solving skills. (omitted)

(2) What coaching methods work?

There are many different types of coaching methods, but the main ones are: guided coaching, active coaching, question and answer coaching, and propositional coaching. The most effective coaching method for learners is personalized coaching, which is tailored to the learner's level and needs. Personalized coaching considers the learner's ability and the difficulty of the task.

(3) Do you have any recommendations for coaching methods?

- Setting goals: All coaching is about achieving goals, so you need to clearly define them and create a plan. This requires a conversation to identify, refine, and organize your goals.

- Asking questions: The most important thing in coaching is asking questions (emphasis added) Actively listen: In coaching, you need to actively listen to what the person is saying. (middle)

-Create a plan to achieve your goals: In coaching, you need to create a plan to achieve your goals. It's important to create a detailed and specific plan and set individualized steps to achieve the goal. Such a granular plan will help the person discover what they are missing and make it easier for them to modify and execute.

- Ongoing assessment and feedback: Ongoing assessment and feedback are important in coaching. The coach should provide feedback on whether the person has reached their goals and what their efforts have resulted in, giving them room to modify and add to their plan after setting

goals.

(4) As a professor teaching the course "Service Interview Practice II," what coaching methods would be advisable to apply to learners?

- Individualized feedback: Pay attention to your learners and provide appropriate feedback based on their individual needs and progress.

- Simulate real-life interviews: Recreate real-life interview situations so learners can experience what to expect.

- Peer assessment and discussion: Create an environment where learners can evaluate each other's interviewing skills and give and receive feedback, so they can help each other improve. Role play: Implement an activity where learners take turns playing the roles of interviewer and candidate and give feedback to each other.

- Practice a variety of interview questions: In addition to the expected questions, practice asking questions to build your ability to handle the unexpected.

- *Boost confidence: Help learners believe in their abilities and overcome anxiety.*

- How to express work-related experience and curiosity: Teach learners how to articulate their work-related experience and curiosity in interviews.

- *Identify improvements and trial and error: Help learners identify improvements, trial and error, and grow together.*

- Continuous learning and repetitive practice: Encourage learners to improve their interviewing skills through continuous learning and practice.

- *Set results-driven goals: Set clear objectives and work together to identify strategies that will help you achieve them.*

(5) What are some coaching approaches that highlight learners' strengths?

- *Strengths discovery: It's important to help learners recognize their strengths. Find your strengths You can help them help you, or you can have them record their achievements to identify strengths.*

- Provide positive feedback: It's important to consistently provide positive feedback to learners, specifically pointing out their successes. This helps learners feel confident in their strengths, which helps them build on them and perform better.

- Goal setting and challenges: Setting goals related to learners' strengths, and the challenges that come with meeting those goals, can help build confidence and further develop strengths.

- *Strengths-based competency development: Help learners create a competency development plan based on their strengths, and then work through the plan to leverage those strengths in different areas.*

- Strengths-based teamwork: Help learners work collaboratively with others on team projects, playing to the strengths of each team member.

- Share success stories: Help learners share success stories related to their strengths with others, expanding their knowledge and improving their interpersonal skills in the process.

(6) What coaching techniques can be used to address learners' areas for improvement? Can you suggest coaching methods that motivate learners without causing emotional distress?

Here are some principles regarding such coaching methods.

- *Be positive: Focus on the learner's good points and strengths and emphasize that there's room for improvement where they're struggling.*

- *Specific feedback: Tell the learner clearly what they need to improve but be as specific as possible and give examples.*

- *Understand and agree: Communicate persuasively to help learners acknowledge and understand the problem. The more they understand and agree, the more likely they are to make positive change.*

- *Suggest improvement strategies: Provide concrete actions and strategies to improve the problem. Create a step-by-step plan of action and help the learner follow through.*

- *Be patient and encouraging: Encourage your learners to be patient as it can take time to improve their deficiencies. Also, be encouraging and praise them whenever they experience change and growth.*

- *Show personal concern: It's important to coach with consideration for learners' feelings and thoughts. Empathize with what they're feeling and say and do things to ease their worries.*

- *Adequate breaks and stress management: Understand that it can be difficult for learners to take in large amounts of feedback and encourage them to take adequate breaks. You can also suggest stress management techniques to help them learn efficiently.*

3) This course conducts both the midterm and final exams as mock interviews. The evaluation criteria for these mock interviews consist of external and internal assessment items. The midterm exam will be evaluated on a 20-point scale using these external and internal evaluation criteria, while the final exam aims to measure how much progress has been made since the midterm. At this time, could you create the evaluation items for the final exam on a 20-point scale?

(1) Final exam assessment items (out of 20 points):

a. Extrinsic evaluation (10 points)

- *Appearance and attire (3 points): Neat appearance and dress, appropriate makeup and accessories*

- *Attitude and body language (4 points): Healthy posture, appropriate eye contact with others in conversation, natural hand gestures*

- *Pronunciation, tone, and voice (3 points): Pronunciation is clear, natural tone of voice and appropriate pitch*

b. Internal evaluation (10 points)

- *Job-related knowledge and competencies (4 points): Demonstrates a good understanding of the knowledge and competencies related to the job of Flight Attendant*

- *Ability to communicate and handle situations (4 points): Understands questions, responds clearly, and reacts appropriately to situations*

- *Attitude and maturity (2 points): Applicant's positive attitude, mature understanding and judgment, curiosity and enthusiasm.*

This final exam will focus on assessing how much you have improved based on your midterm results. Points will be awarded based on the external and internal assessment criteria from the midterm, with additional points awarded for improvement on the final exam.

2.4. Step 4: Collaboration between HI and AI to derive results for class improvement

HI conducted a series of diverse questions with AI assistants, Wrtn and ChatGPT, regarding areas identified for improvement that were rated below 2 points in the course syllabus analysis tool. Through this discussion process, HI, the researcher of this study, revised and supplemented the necessary aspects for improving the course as outlined in <Table 2> Course Improvement for the Subject of This Study - Course Syllabus, and <Table 3> Mock Interview Evaluation Form Before and After Course Improvement for the Subject of This Study.

Table 2. Improved course syllabus.

Class Basics			
Subject name	Service interview practice II	Grade	4
Subject code / Class	bap00551 / 0003400	Course divisions / Credits	Elective courses / 3
Classroom / Classroom	Tue - 1(red314) / Tue - 2(red314) / Tue - 3(red314)		
Competency Information			
Competency name	Ratio	Definition	
Communication skills	100%	The ability to demonstrate flexible communication skills for effective customer interaction in the service field	
Competencies and alignment		Practical expertise, problem-solving and communication skills	
Course outline, Learning objectives, Learning methods, Teaching methods			
Overview	<p>1. Overall class goal: To improve your working knowledge, communication skills, and self-reflection on interviewing in the aviation and hospitality industries.</p> <p>2. In the advanced course on communication skills, the instructor applies coaching methods (instructor coaching, peer coaching, self-coaching) to derive actionable competencies required for candidates in actual face-to-face interviews.</p> <p>1) Instructor Coaching: Written coaching on learner assignments and oral coaching after face-to-face mock interviews with learners.</p> <p>2) Peer Coaching: Written and oral coaching after face-to-face mock interviews with learners.</p> <p>3) Self-Coaching: A process in which learners evaluate themselves and provide feedback based on the feedback received from the instructor and peers after face-to-face mock interviews, allowing them to understand their own progress.</p>		
Teaching Methods	<p>**Flipped Learning and Coaching Class (Revised)</p> <p>Pre-Class (1 Hour Video Lecture): Watch the core theory video lecture and complete assignments (Response Notes, Interview Evaluation Form for Self-Coaching).</p> <p>In-Class (2 Hour Face-to-Face Lecture): Practical exercises (mock interviews, discussions), coaching (instructor and peer).</p> <p>Post-Class: Practical exercises (mock interviews) and Interview Evaluation Form for Self-Coaching.</p>		
Evaluation Methods and Criteria	<p>1. Assignment evaluation: 50 points total</p> <p>1) Answer note (adjusted to 10 times * 2 = 20 points)</p> <p>(1) Number of questions: 5 or more (non-fulfillment = 0 points)</p> <p>(2) Rate the sincerity of your answers: Very Good 2/Good 1/Poor 0</p> <p>2) Interview Evaluation Sheet Self-Coaching : 20 points (Total 10 times *2 = 20 points)</p> <p>(1) Weeks 5-6 (2x): Organize lesson content</p> <p>(1)-1. Evaluate the sincerity of writing the assignment : Verygood 2/Good 1/Lacking 0</p> <p>(2) Weeks 7-14 (8 sessions)</p> <p>Self-feedback (interview scorecard_ Self-coaching) by applying mock interview, professor feedback after midterm, and peer feedback</p> <p>(2)-1. Evaluate the sincerity of writing the assignment: very good2/good1/poor0</p> <p>3) Setting results-driven goals : 10 points</p> <p>(1) Where to improve</p> <p>a. Specify the item, due date, and degree to which it is achievable, and start the activity after the midterm.</p> <p>b. Instructors meet with individual learners after the midterm. At this time, the learner explains how</p>		

	<p>they will work to make up for this content. The instructor looks at the learner's progress on this commitment from Weeks 11 through 15 and evaluates it in Week 15.</p> <p>c. 5-point scale: Very good - Good - Average – Insufficient – Very Insufficient</p> <p>(2) Emphasis</p> <p>a. Specify the item, due date, and degree to which it is achievable, and start the activity after the mid-term.</p> <p>b. Instructors meet with individual learners after the midterm. At this time, the learner explains how they will work to make up for this content. The instructor looks at the learner's progress on this commitment from Weeks 11 through 15 and evaluates it in Week 15.</p> <p>c. 5-point scale: Very good - Excellent - Good - Fair - Poor - Very Poor</p> <p>(3) Scorecard</p> <p>a. Learners participate by completing the "Learner Created" field below during their individual meeting with the instructor in Week 9.</p> <p>b. Learners complete and submit learner self-assessment to instructor in Week14</p> <p>c. Instructor gives student an instructor assessment on this paper in Week15</p> <p>d. Results-driven goal setting scorecard</p>							
Learner submission				Learner self-assessment		Instructor evaluation (Score reflection)		
Category	Item	Deadline	Degree of achievability	VG	G	A	I	VI
Areas for improvement								
Areas to emphasize								

Table3. Mock interview evaluation form before and after class improvement.

Before improvement		After improvement			Assessment
Interview details	Key evaluation points	Interview details	Evaluation criteria	Key evaluation points	
Appearance / Impression/ Attitude	Appearance/Impression/Smile (Flight attendant image, friendly impression)	External evaluation	Appearance / attire	Appearance/Impression/Smile (Crew member bright image,	5-point scale
	Appearance (Attire, Make-up, Hair-do)			Is your appearance (outfit, makeup, hair-do) neat?	
	Natural gait		Natural gait		
	Greeting attitude		Greeting posture (Upright posture / Smile / Eye-contact natural / Legs well together / Are you able to steadily lower and raise		
	Posture during responses (Is the posture straight / Is the smile maintained / Is eye contact well maintained?)		Attitude / gestures	Posture when answering (Straight posture / Smile / Eye-contact natural / Natural hand gestures well Will it hold?)	
	Posture while listening (Is the posture straight / Is the smile maintained / Is eye contact well maintained?)		Posture when listening (Straight posture / Smile / Eye-contact natural / Natural hand gestures well Will it hold?)		
Tone of voice Vocal delivery	Tone of voice (Kind, trustworthy, and stable voice)	Pronunciation, tone, and voice	Tone of voice (friendly, trustworthy, reliable)		
	Appropriate pitch and volume (Does the person express their story with liveliness?)		Pitch and Intensity Appropriateness (Does it express my story vividly?)		
	Speech pace and appropriate pauses		Pace of speech, with appropriate pauses		
	Clear communication ability		Is it pronounced clearly		

	A natural, conversational feel			Is it conversational and natural?
	A sense of confidence and determination			Understanding of the Core Question (Accurate comprehension and structuring around key points)
Response content	Understanding of the Core Question (Starting with a conclusion?)	Internal Evaluation	Job-related Knowledge and Skills	Understanding of Airline Desired Qualities
	Comprehension and Experience Support			Understanding of Flight Attendant Role
	Innovativeness of Response			Support from Specific Experiences
	Expression of Passion (a genuine passion for becoming a flight attendant?)		Communication and Situational Response Skills	Clarity in Communication (Starting with Conclusion)
	Understanding of Airline Desired Qualities			Innovativeness of Response
	Understanding of Flight Attendant Role			Demonstration of Confidence and Passion for Becoming a Flight Attendant
	Diligence in Preparation		Attitude and Maturity	Diligence in Preparation for Flight Attendant Role?
	Overall Suitability for Acceptance			Overall Suitability for Final Acceptance as a Flight Attendant

3. Conclusion and Utilization Plan

The results of this study demonstrate that the collaboration between generative text artificial intelligence and human intelligence can enhance the quality of instruction. It is anticipated that this approach will enable the improvement of various major courses through the utilization of AI tools. Furthermore, through the collaboration between artificial intelligence and instructors regarding course content and assessment methods, it is expected that student engagement and learning outcomes will be significantly enhanced. In addition, the expansion of the use of artificial intelligence in the educational field is expected to contribute to the increase of active participation of learners and the improvement of academic achievement. Summarized findings are shown as follows:

First, This is the revised content regarding the 'Course Objectives' section from the "Service interview practice II course" syllabus analysis tool (Categorical Matrix).

1. Overall class goal: To improve your working knowledge, communication skills, and self-reflection on interviewing in the aviation and hospitality industries.
2. Introduction to the concepts of faculty coaching, peer coaching, and self-coaching
 - 1) Faculty coaching: written coaching on learner assignments, oral coaching after learner face-to-face mock interviews
 - 2) Peer coaching: Written and oral coaching after learner face-to-face mock interviews
 - 3) Self-coaching: Learners self-assess their progress by filling out a self-assessment sheet with feedback from professors and peers after an in-person mock interview.

Second, the Syllabus Analyzer(Category Matrix) has been enhanced for the 'Learner', 'Teaching Method', and 'Teaching Media' sections.

1. Flipped Learning and Coaching classes are preceded by a video lecture and last 1 hour and further specify that the class will be taught in-person and will take 2 hours.
2. Assessment methods and criteria that we've derived to enhance course evaluation. The course evaluation is worth 50 points and consists of three parts.

Answer Notes(20 points), Face-to-Face Evaluation Sheet Self-Coaching (20 points), and Result-Oriented Goal Setting (10 points). Of the three items, outcome-based goal setting is a new concept, and you will be asked to attend a post-midterm meeting with your instructor to discuss areas for improvement and emphasis. After the meeting with your instructor, you will work on the activities from Week 10 to Week 14 and submit a self-assessment to your instructor in Week 14, which you will evaluate in Week 15. For the evaluation, a new 'result-oriented goal-setting evaluation table' was constructed. The details are shown in <Table 10> Teaching improvement of the subject under study - Evaluation method for improving the competency of the syllabus.

Third, the 'Evaluation Method' section of the Syllabus Analysis Tool - Metrix by Category has been supplemented. The top concept of the mock interview scorecard has been revised from three categories (appearance/impression/attitude, tone/voice/delivery, and answer content) to two categories (external evaluation and internal evaluation). In addition, the external evaluation was divided into three subcategories: appearance and dress, attitude and body language, and pronunciation, tone, and voice. The internal evaluation was divided into three subcategories: job-related knowledge and competence, communication and situation handling skills, and attitude and maturity. Based on this division, detailed question items were placed in the appropriate subcategories.

4. Future Development Plans and Suggestions

This study has highlighted the necessity for instructors, as practitioners of human intelligence, to continuously engage in research and development by utilizing various pedagogical models to enhance instructional effectiveness. Furthermore, in the context of major courses, it is essential that course design enables learners to acquire competency-based skills, and it is crucial to develop and refine diverse instructional methods to foster these abilities.

This study implemented a method for enhancing instructional practices through the collaboration of human intelligence and artificial intelligence. In the case of text-generating artificial intelligence, results consistent with the purpose and intention are derived depending on how the questioner asks the question[27][28][29][30]. Accordingly, additional and continuous research is needed on the creation of the contents of prompts to improve the university curriculum. In addition, this study applies only the generative text artificial intelligence program and utilizes it for class improvement, but additionally, efforts should be made to apply it to class improvement by learning various functions of generative artificial intelligence such as voice, video, and photography.

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6. Appendix

6.1. Author's contribution

	Initial name	Contribution
Lead Author	SL	<ul style="list-style-type: none">-Set of concepts <input checked="" type="checkbox"/>-Design <input checked="" type="checkbox"/>-Getting results <input checked="" type="checkbox"/>-Analysis <input checked="" type="checkbox"/>-Make a significant contribution to collection <input checked="" type="checkbox"/>-Final approval of the paper <input checked="" type="checkbox"/>-Corresponding <input checked="" type="checkbox"/>
Corresponding Author*	SA	<ul style="list-style-type: none">-Play a decisive role in modification <input checked="" type="checkbox"/>-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/>-Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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