



To cite this article: Seok Ho CHANG and Soonhui LEE (2024). Integrating AI into Operations Management Curriculum at Hankuk University of Foreign Studies: Preceding Research, Challenges, and Recommendations. International Journal of Education, Business and Economics Research (IJEER) 4 (4): 188-207

INTEGRATING AI INTO OPERATIONS MANAGEMENT CURRICULUM AT HANKUK UNIVERSITY OF FOREIGN STUDIES: PRECEDING RESEARCH, CHALLENGES, AND RECOMMENDATIONS

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<https://doi.org/10.59822/IJEER.2024.4418>

ABSTRACT

Artificial intelligence (AI) significantly impacts global industries and education. This paper examines the integration of AI into the curriculum of operations management (OM) courses at the College of Business, Hankuk University of Foreign Studies (HUFS). Drawing on existing literature, it examines divergent views on AI's potential to enhance learning and educational efficiency, while addressing ethical considerations. Analyzing AI policies and case studies from universities, it explores practical implications and challenges in educational contexts. The study then proposes strategies for improving students' ability to interpret AI information and offers recommendations for instructors. Despite focusing on OM courses at HUFS, this paper provides insights applicable to AI implementation in similar programs worldwide.

KEYWORDS: - Artificial intelligence, operations management education, educational innovation, lecturer strategies for AI.

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Published Online: August 2024

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1. INTRODUCTION

Investment and interest in artificial intelligence (AI) technology are continuously increasing worldwide. Companies worldwide are innovating their business models with AI, while governments and academia are intensifying research and strategic investments in this field (see Tables 1-2 in Section 2 for details).

In the rapidly evolving global business environment, there is a growing interest among universities in integrating AI into the teaching of operations management (OM) courses within their business

departments. Management and business departments, both domestically and internationally, encompass various specialized subfields such as Finance/Accounting, Marketing, Operations Management, Organizational Behavior/Human Resources, and others, etc. These fields are shaped by academic traditions and industry demands, with degree programs and research centers often specializing in these areas.

In the education sector, concerns and opportunities surrounding AI adoption are widely debated. Some instructors express apprehension about AI potentially displacing human instructors and the risks associated with data privacy, including the confidentiality of students' personal information and learning data. Conversely, proponents advocate for the proactive adoption of AI technologies, citing benefits such as enhanced innovation in teaching methodologies, personalized learning experiences, and improved educational efficiency (see Table 3 in Section 2 for details).

Educational institutions, businesses, and governments are collaboratively leveraging AI technology to foster educational innovation in the AI era. Their efforts are aimed at enhancing learning experiences and developing personalized support systems for learners, as evidenced by examples in Section 2.

The purpose of this paper is to discuss the potential and utility of AI, including its partial integration, in teaching OM courses within the Department of Operations Management at the College of Business, Hankuk University of Foreign Studies (HUFSS), focusing exclusively on cases related to the authors' department. To achieve this, we first provide a brief review in the following categories: (i) AI-related education policies and support plans: global perspectives, (ii) contrasting perspectives on AI utilization in education and business, (iii) ethical guidelines on AI at the College of Business, HUFSS, (iv) cases of AI integration in teaching OM at selected domestic and international universities, and (v) considerations for ethical use of AI-generated knowledge.

Subsequently, we present (i) recommendations for enhancing OM students' skills in interpreting AI information, and (ii) suggestions for lecturers in OM, along with discussing potential challenges and considerations in selectively integrating AI into OM courses.

2. REVIEW OF RELATED WORK

2.1 AI-education-related policies and support plans: global perspectives

Tables 1 and 2 summarize some of the AI education-related policies and support plans announced by various organizations and countries.

Table 1: Some-of AI education-related support plans announced by various organizations (2020-2024)

<i>Date</i>	<i>Organization</i>	<i>Investment/Case Details</i>	<i>Scale and Specifics</i>
May 2024	Coursera	Expansion and improvement of AI-based online education content through the introduction of AI translation capabilities.	Introduced AI translation capabilities to offer over 4,400 courses, previously available only in English, in 22 languages.
February 2023	IBM	Launch of IBM Watson Education	Providing solutions for AI

		and support for education innovation programs	technology utilization in schools and educational institutions
August 2022	Google	Launch of Google AI for Education program	Development and support of learning materials utilizing AI technology in education
February 2022	Microsoft	Expansion of Microsoft Learn for Educators program	Expansion of program to support educators in learning and effectively delivering education methods using AI and other technologies

Source: The information provided in Table 1 has been obtained from each organization's official website, press releases, official announcements [7, 15-16, 30], or Wikipedia [51-52].

Table 2: Some-of AI education-related support plans announced by various countries

Date	Countries	Key Objectives and Investment in AI	AI in Education Sector
March 2024	Government of India	<ul style="list-style-type: none"> •Approval of Rs 10,371.92 crore investments. •Launch of the IndiaAI Mission to catalyze the national AI innovation ecosystem. See INDIAAI [21], for details. 	<ul style="list-style-type: none"> •Promotion of AI innovation and establishment of a comprehensive ecosystem. •Encouragement of AI applications across various sectors, emphasizing technology-based education. •Enhancement of AI education in primary and secondary schools.
March 2024	US Department of State	<ul style="list-style-type: none"> •The Biden administration allocated over \$20 billion for AI in the federal budget proposal for the fiscal year 2025 (October 2024 to September 2025). See Congressional Research Service Report [3] and US Department of State's website [50] for details. •National strategy by the Department of Education to enhance AI education. 	<ul style="list-style-type: none"> •Plans to strengthen AI education from elementary through high school and college. •Improvement of teacher training programs for AI education.
January 2024	EU	<ul style="list-style-type: none"> •Horizon Europe and Digital Europe programmers will invest €1 billion per year in AI. See European Commission [4-6, 9-12], for details. •Launch of the AI Innovation package to support AI. 	<ul style="list-style-type: none"> •Employing practical ideas for implementing AI tools in the educational institution. •Encouragement of the integration of AI into teaching methodologies.
May 2023	Government of Japan	<ul style="list-style-type: none"> •Japan and the U.S. signed a cooperation agreement in education. In the semiconductor field, 11 universities from the U.S. and Japan committed to investing over \$60 million in the next five years to 	<ul style="list-style-type: none"> •Encouragement of schools to introduce AI education and integrate AI into their curriculum. •Initiated a paradigm shift in education by integrating AI into its classroom.

		develop advanced educational curricula [29]. See Memorandum of Cooperation in Education Between the US and Japan [29], for details.	•Enhancement of support for education and research in AI and robotics technology.
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Source: The information provided in Table 2 has been obtained from each government's official website, press releases, or official announcements.

As you can see Table 2, each country is focusing on improving educational curricula in line with technological advancements and enhancing understanding of AI technology.

2.2 Contrasting views on the utilization of AI in education and business

As AI continues to be integrated into both business practices and educational environments, several concerns have emerged from stakeholders in both fields. This section aims to address these concerns by presenting them in a structured table format. By doing so, we can clearly outline the potential drawbacks, considerations and challenges associated with AI implementation in the educational field. From this perspective, the following Table 3 highlights contrasting views on the utilization of AI in education and provides brief explanations.

Table 3: Contrasting views on the utilization of AI in education and brief explanations

Views on AI	Descriptions
Advantage of AI adoption	<ul style="list-style-type: none"> •Enhancement of innovation and learning experience (OECD Education Working Paper [36]; World Bank [53]; World Economic Forum [54]) •Personalized learning (OECD Education Working Paper [36]; World Bank [53]; World Economic Forum [54]) •Efficiency in learning (OECD Education Working Paper [36]; World Bank [53]; World Economic Forum [54])
Challenges and Considerations in AI adoption	<ul style="list-style-type: none"> •Concerns about AI replacing human instructors (University World News [48]; Imperial College Business School [17]). •Issues of major information leaks and personal information protection (Payton and Claypoole [37]; OECD [33]; World Economic Forum [54]). •Ethical and social considerations of AI in education (OECD [31-32]; European Parliament Research Service [12]; UNESCO [44-45]). •AI and student data protection (Berendt <i>et al.</i> [1]). •Reconfiguring Teacher-Student relationship (Gentile <i>et al.</i>[14]). •Some researchers explore a shift from exam-centric to process-centric assessment in classes with AI integration (Fadel <i>et al.</i> [13]). •Challenges in classroom management with AI implementation are noted by some researchers (Pelánek [38]). •Increasing interest in AI-based adaptive learning system design (Pelánek [38]; Joshi [27]).

Table 4: Contrasting views on the utilization of AI in business and specific evidence examples [Economist [8]].

Contrasting Views on AI	Specific Evidence Examples
Encouragement for AI adoption	<ul style="list-style-type: none"> •According to surveys, four-fifths of companies plan to increase AI investments by more than 50% by mid-2024. •Companies like Google and Microsoft are releasing or planning AI-integrated products for their office software suites. •Many companies are experimenting with AI in customer service, financial data analysis, HR management, talent acquisition, marketing efficiency, and more. •Many software developers use Microsoft's coding tool, Copilot, for software development. •There is a sharp rise in global demand for AI experts across industries such as autonomous driving, medical diagnostics, healthcare, financial services, security, e-commerce, marketing, and education.
Skepticism and/or Cautions about AI	<ul style="list-style-type: none"> •Only about one-third of global corporate managers outside the tech sector continue to use generative AI. •It is proposed to rigorously calculate the expected costs and benefits of introducing AI within companies. Attention should be paid to employee concerns. •Workers and frontline managers acknowledge AI's potential to reduce strenuous human labor but raise concerns about job displacement and express pessimism. •Companies lacking robust data management mention the need for system restructuring due to the risk of internal confidential data leaks. •Some Hollywood actors and writers have filed lawsuits regarding AI-related privacy exposure •Some countries, such as the EU, US and Canada, have passed laws related to AI regulation.

Source: The information provided in Table 4 has been obtained from Economist [8], and its official website, press releases, or official announcements.

It is noted that Economist [8] mentions the increasing importance of accuracy and reliability in AI responses, as well as the advancement of effective methods for utilizing AI models. In the context of introducing AI partially into OM courses, previous studies underscore adherence to principles such as those set forth by the OECD AI Principles, which advocate for innovative and trustworthy AI applications that align with human rights and democratic values, as codified to an extent in legislation including the EU Artificial Intelligence Act (AI Act), Canadian Artificial Intelligence and Data Act (AIDA), and US Executive Order on the Safe, Secure, and Trustworthy Development and Use of AI. See the OECD report on AI, data governance, and privacy [33] for details.

2.3 Ethical guidelines on AI at College of Business, HUFS

We present ethical guidelines on AI at College of Business, HUFS in Table 5.

Table 5: Ethical Guidelines on AI at School of Business, Hankuk University of Foreign Studies (HUFS)

- 1) Avoid both blind faith in and baseless rejection of AI.
- 2) Verifying the accuracy of information provided by AI is the responsibility of the user.
- 3) The decision to use AI and the process of its utilization must be disclosed along with the outcomes.
- 4) Distinguish clearly between content created using AI and one's own intellectual contributions.
- 5) Share emotional opinions freely that can enhance the utility of artificial intelligence.

There are no specific guidelines regarding the use of AI in management courses other than those provided above in Table 5. The potential for AI utilization depends on the characteristics of each management course and the teaching policies of individual instructors.

2.4. Cases of AI introduction in teaching OM in some universities

We present some cases of AI introduction in teaching OM in some university business departments in Tables 6-9.

Table 6: Cases of AI integration in teaching OM in some university business departments/schools

University	AI integration overview
IIT (Indian Institutes of Technology), Delhi, India	Providing various courses including AI and data analytics. Students have the opportunity to analyze real business cases and enhance problem-solving skills using AI technology.
IIT Kharagpur, India	Students have the opportunity to learn data analysis using AI and strategic decision-making, which they can apply to real-world industrial problems.
ISB (Indian School of Business), India	Providing comprehensive programme designed to equip executives with the knowledge, tools and strategies to navigate the intersection of leadership and AI. Provide courses on advanced data analytics to support students in developing the ability to make data-driven decisions.
IIM (Indian Institutes of Management), India	Providing innovative education programs, including AI and data analytics, AI for strategic decision-making, real-world application in industries. Integrating the crucial technology of AI into business education equips students with the latest tools and skills, enabling them to compete effectively in the industry.
Tsinghua (Qinghua) University, China	Providing innovative education programs, including AI and data analysis. Curriculum features courses on AI-based business analysis and strategic decision-making.
Peking (Beijing) University, China	Providing educational programs integrating AI technology. Students learn to utilize AI for market analysis, predicting customer behavior, and automated decision support systems.
Shanghai Jiao Tong University, China	Providing innovative education program based on AI and big data. Students have the opportunity to analyze real business cases and enhance problem-solving skills using AI technology.
Seoul National University, College of Business,	Enhancing OM education based on AI and big data analysis.

Republic of Korea (ROK)	Topics include designing production planning, inventory management, and service operations using AI techniques.
Hanyang University, Business Department, ERICA Campus, Ansan, ROK	Offers education in smart management utilizing AI technology. Students learn methods to increase production efficiency by collecting and analyzing data generated in manufacturing processes.
Sungkyunkwan University, School of Business, ROK	Provides education using AI for marketing analysis, financial data analysis, and operational management, especially in supply chain management and production processes.
California State University, USA	Uses AI for real-time data analysis and predictive modeling in OM courses. Students solve various operational management issues such as production planning, inventory management, and transportation problem using AI tools through actual business case studies.
University of Cambridge, UK	In the master's program in management, deeply covers financial management and risk analysis using AI. Students practice designing investment strategies and predicting market volatility using AI algorithms.
London Business School, UK	AI and big data are central themes in business education. Students can develop the skills necessary to solve problems and uncover new opportunities by applying AI technology to real-world business cases.
University of Melbourne, Australia	Teaches students in industrial and OM courses to design smart manufacturing systems using AI. Explores enhancing production process efficiency through AI-based automation and data analysis technologies.

Source: The information provided in Table 6 has been obtained from each university's official website, press releases, or official announcements [2, 18-20, 23-25, 26, 28, 39-43, 47].

Table 6 presents examples of how several universities are integrating AI into management and operations management courses, providing students with fundamental competencies to make operational and management decisions using AI technology. Data analysis and predictive modeling through AI are increasingly crucial in OM education, significantly enhancing competitiveness in industrial environments.

2.5 Review of ChatGPT and major AI products release since 2020

Tables 7 and 8 provide a brief summary of major versions of ChatGPT and major AI products, specifying their release years and months, along with key features for each version.

Table 7: Major versions of ChatGPT, including their release years and months (OpenAI, 2018-2024, and Wikipedia [51])

Version	Release Year and Month	Key Features
GPT-1	June, 2018	The first Generative Pre-trained Transformer model released. Based on the basic Transformer architecture for natural language generation.

GPT-2	June, 2019	Larger and more powerful than GPT-1. Composed of 1.5 billion parameters, excelling in natural language understanding and generation tasks.
GPT-3	June, 2020	Very large model with 175 billion parameters. Offers even greater diversity and sophistication in language understanding and generation compared to GPT-2.
GPT-3.5	November, 2022	An updated version based on GPT-3. Enhanced performance, sensitivity, and prediction capabilities.
GPT-4o	May, 2024	<ul style="list-style-type: none"> •OpenAI's latest AI language model, with improvements in parameters, learning mechanisms, and enhanced language understanding capabilities. •The demonstration highlighted real-time conversational capabilities, switching from Text-to-Speech (TTS) to Speech-to-Speech (STS) with a response time of 0.23 seconds, faster than the average human response of 0.32 seconds. •Additional capabilities demonstrated include: human-like conversational speed, continuity through interruptions, video call-like interaction, understanding of tone, facial expressions, and emotions, real-time recognition and description of images and videos, evaluation of appearance and fashion, comprehensive situational awareness for assessing professions and user context, text recognition for explanations and math problem-solving, adaptive tone adjustment, and ability to use humor and exaggerated speech [Wikipedia [51]].

Source: The information provided in Table 7 has been obtained from OpenAI's official website, press releases, official announcements or Wikipedia [51].

Table 8: Brief summary of major AI products released since 2020

Company	Product name	Release year	Brief feature
Google	Google AI	Released periodically since 2020	Google Cloud AI APIs, supports Google Brain research initiatives, etc
Microsoft	Azure AI	Released at intervals since 2020	Offer Azure Machine Learning (automated ML, model management), Cognitive Services(Text Analytics, Speech Recognition), Azure Bot Service (chatbot development), etc
Amazon	AWS AI	Released regularly since 2020	Includes Amazon SageMaker (ML model building and deployment), Amazon Lex (chatbot development), Amazon Polly (text-to-speech service), etc.
GitHub	Copilot	2021	AI-powered code completion tool developed in collaboration with OpenAI, assists developers in writing code, suggesting solutions, and improving productivity.

Source: The information provided in Table 8 has been obtained from each organization's official website, press releases, official announcements, or Wikipedia [51]

Looking at Tables 7 and 8, it can be observed that AI technology has been developing rapidly day by day recently. Due to continuous advancements in AI technology, integration of AI in the

education sector is expected to further develop. Such technological progress is anticipated to enhance educational efficiency, improve accessibility, and enrich learners' educational experiences.

2.6 Studies on considerations for Ethical Use of AI-Generated Knowledge

Table 9 presents a brief summary of some issues mentioned in surveys and AI literature regarding AI training data.

Table 9: A brief summary of some issues mentioned in surveys and AI literature regarding AI training data [Wikipedia]

Issue type	Description
Data Bias	The phenomenon where AI training data overly reflects certain groups or characteristics
Misuse of Information	The risk that AI may misinterpret data and draw incorrect conclusions
Data hallucination	The phenomenon where AI generates fake data or learns from data that does not actually exist.
Amplification and reproduction of false information	The problem of AI spreading or magnifying incorrect information
Risk of Privacy Invasion and Leakage	Potential for data used in AI training to include and leak personal information Risks of potential privacy exposure in AI training processes
Lack of Understanding Human Context in Conversations	The issue where AI fails to understand human context or situations properly in conversation

Considering the issues in Table 9, we summarize several points to consider when utilizing AI-generated knowledge to ensure its effective and ethical use in Table 10.

Table 10: Points to consider in utilizing AI-generated knowledge

- **Verify Information Reliability:** Carefully assess the source and reliability of information provided by AI, checking for biases or inaccuracies.
- **Cross-check from Multiple Sources:** Verify and compare AI-generated information from multiple sources and perspectives.
- **Ethical Considerations:** Evaluate whether AI-generated or recommended information aligns with ethical standards, particularly concerning privacy issues.
- **Prevent Misuse of Information:** Interpret and use AI-provided information accurately to prevent its misuse.
- **Clarify Purpose of Use:** Clearly define the purpose of using AI-generated information and ensure it aligns with ethical and appropriate practices.

The points presented in Table 10 represent general considerations to be taken into account when utilizing AI knowledge. In this paper, we will suggest guidance on specific methods for instructors/lecturers in OM to instruct students on using AI (see section 2 in Results, for details).

3. RECOMMENDATIONS

In this section, we present main results. As mentioned in Table 10, it is important to verify the reliability and accuracy of information provided by AI and to prevent its misuse. From this point of view, we first present suggestions for OM students to improve AI information interpretation skill in Section 1. Relevant chat examples with ChatGPT are presented. Considering the issues Tables 3-10, we also provide suggestions for lecturers/instructors in OM regarding the integration of AI in their lectures in Section 2.

3.1 Suggestions for OM students to improve AI information interpretation skill

In this subsection, we present suggestions (1 and 2) for OM students to improve their AI information interpretation skills, illustrated through chat examples with GPT (see the Examples 1 and 2 provided for further insight).

Suggestion 1: To develop a keen ability to interpret AI-provided information accurately, it is important for students to possess sufficient background knowledge related to OM in business administration.

Examples supporting the above content are as follows.

Example 1.

To properly understand a phrase generated ChatGPT such as "reducing the bullwhip effect within the supply chain to enable more efficient and stable operations," it is crucial to grasp the concept of the bullwhip effect first. Insufficient background knowledge will hinder readers from interpreting this text correctly. Through this example, we can understand the crucial role that background knowledge plays in reading and comprehending texts related to OM in business administration. The ease or difficulty of reading such texts depends largely on the reader's level of relevant field-specific background knowledge.

Example 2.

The question in Table 11 was designed to test whether ChatGPT understands common economic principle and concept of variability in OM.

Table 11: Chat example (1) with ChatGPT

Question:

Could you solve the following problem? Corporation A, a large company, is considering whether to invest in the following three projects depending on the expected economic conditions. The average ROI (Return on Investment) for Project 1 is 2.5%, for Project 2 is 4.3%, and for Project 3 is 4.4%. For analytical convenience, let's assume a payback period of one year for the investment. Which investment project should they choose?

ChatGPT:

To determine which investment project Corporation A should choose based on the information provided, we need to compare the ROI (Return on Investment) of each project.

Here are the average ROIs given:

Project 1: 2.5%

Project 2: 4.3%

Project 3: 4.4%

Since the ROI represents the return on investment as a percentage of the initial investment, a higher ROI is generally preferable, assuming all other factors are equal.

Comparing the ROIs:

Project 1: 2.5%

Project 2: 4.3%

Project 3: 4.4%

Based on these figures, Project 3 has the highest ROI at 4.4%, followed by Project 2 at 4.3%, and Project 1 at 2.5%.

Therefore, Corporation A should choose Project 3 because it offers the highest return on investment (4.4%) among the three projects listed.

As we can see from Table 11, it can be noted that ChatGPT provided a restricted answer to the given question. We summarize our comments on the response of ChatGPT in Table 12:

Table 12: Authors' comments on the response of ChatGPT in Table 14.

ChatGPT suggested that corporation A should choose Project 3 because it offers the highest return on investment (4.4%) among the three projects listed. But the discussion presented in ChatGPT's response did not meet our expectation. At least the following two important issues should be discussed:

- 1) Based on our rational thinking, each investment proposal must have a return rate at least higher than Minimum Attractive Rate of Return (MARR) for it to be considered worthwhile, which is not discussed in ChatGPT's response to our question.
- 2) The response of ChatGPT did not discuss the issue of the concept of variability or uncertainty: In situations with high variability and uncertainty in returns, it is important to consider the variability or uncertainty of returns. For convenience, suppose that MARR which is determined by management is 3.5%. Then Investment proposal 1 can be excluded from consideration because its return rate is lower than 3.5%. For conservative investors, while there are several factors to consider when making investments, a key consideration would be whether the additional average ROI values (0.8% and 0.9%) offered by investment proposals 2 and 3, which yield higher expected returns than MARR, are reliably guaranteed one year later.

To get a more useful information for decision-making compared to response 1 in Table 12, we reformulated our question in Table 12 as follow and asked it to the chatGPT:

Table 13: Chat example (2) with ChatGPT

Question:

Could you solve the following problem? Corporation A, a large company, is considering whether to invest in the following three projects depending on the expected economic conditions. The average ROI (Return on Investment) for Project 1 is 2.5%, for Project 2 is 4.3%, and for Project 3 is 4.4%. For analytical convenience, let's assume a payback period of one year for the investment. What factors should be taken into consideration when deciding whether to invest or not?

ChatGPT:

Here are the key considerations you should take into account:

ROI (Return on Investment): Each investment option has a different expected ROI. Investment 1 has an ROI of 2.5%, investment 2 has an ROI of 4.3%, and investment 3 has an ROI of 4.4%. Higher ROI indicates higher potential returns, but there are other factors to consider.

Risk according to Economic Trends: The expected ROI of investment options may vary depending on economic trends. For example, during recession, Investment 1 may offer more stability, whereas during boom, Investments 2 or 3 may be more promising. Therefore, analyzing the risk and returns of each investment option in light of future economic outlook is essential.

Available Investment Funds: Consider the amount of funds that Company A can invest. Even if there are investment options with high returns, they may not be suitable if they exceed the available investment budget.

Other Factors: Consider the nature of each investment, risk tolerance, market outlook, and other relevant factors. Sometimes, an investment with a higher ROI may entail higher risks.

Considering these factors comprehensively is crucial for making sound investment decisions.

Although the discussion on MARR is still not included in the response provided by ChatGPT in Table 13, it can be observed that the response provided by ChatGPT in Table 13 includes more useful information for decision-making compared to response 1 in Table 11.

Through Examples 1 and 2, we confirmed the importance of possessing sufficient background knowledge when utilizing AI in studying OM. Additionally; we have also deduced the following: Individuals with a strong background in OM can ask AI better questions regarding the same problem to obtain qualitatively better answers.

Remark 1. We emphasized the importance of expanding basic background knowledge in OM as outlined in suggestion 1 to enhance accurate AI information interpretation skills. Developing proficiency in OM requires continuous and diligent learning, rather than being formed overnight.

Remark 2. During the process of expanding basic background knowledge in OM, AI can serve as a supportive tool. For example, it could effectively enhance learning comprehension compared to traditional methods by facilitating activities such as searching recent cases in OM, interpreting some challenging passages found in textbooks and lecture materials on OM, and providing clear explanations of specialized terminologies in OM tailored to learners' proficiency levels. In this context, see the Strategies for Using AI in OM Learning in Section 2.

Remark 3. It's important to verify AI-provided knowledge by comparing it with reliable sources like library resources, academic papers, and credible online resources, especially when reliability is uncertain. In this context, see the Strategies for Using AI in OM Learning in Section 2.

Remark 4. When using generative AI, it is important to ensure that confidential information such as personal details or learning history in OM is not included.

Suggestion 2: To effectively reduce excessive addiction and dependency on AI among OM students and enhance learning outcomes, it is advisable to adopt the following learning strategies:

- 1) Instead of immediately asking AI when you don't know the answer to a given assignment, first attempt to solve the problem independently.
- 2) After attempting the problem on your own, ask AI for assistance and compare its response with your own answer.
- 3) Validate AI's response and your own answer against various objective sources, such as textbooks, academic papers, and credible online sources.
- 4) Finally, synthesize the verified answers into the closest possible solution to the problem.

These steps promote independent thinking and thorough validation, contributing to improved learning efficacy while mitigating overreliance on AI. In this context, see the Suggestion 3 provided in Section 2.

3.2 Suggestions for lecturers/instructors in OM

We present some suggestions which could possibly be used to utilize ChatGPT for teaching courses in OM in the field of Business Administration.

First we would like to mention that the partial introduction and/or utilization of AI in teaching OM courses can expand the diversity of learning and the array of learning method options for students in OM.

Considering the issues in Tables 3-4, AI taking a leading role in teaching, assessment, and classroom management, with human instructors shifting to a supportive role, would not be desirable at present. We can consider the following compromise:

Suggestion 1: Human instructors can utilize AI as a supplementary tool to enhance classroom operations, aiming to improve students' learning effectiveness, particularly in the following areas.

➤ **Providing supplementary and advanced learning materials including visual or multimedia materials**

Use ChatGPT to recommend additional advanced learning materials (e.g., digital transformation and the rise of Industry 4.0 technologies, managing decarbonized supply chains and energy grids in response to climate change, increasing adoption of AI in operations, environmental impact considerations in supply chain management, supply chain disruptions due to global crises such as the COVID-19 pandemic, etc) on OM to students, and to regularly update course materials reflecting recent case studies in OM. They lead classes directly using the updated curriculum, aiming to enhance students' learning effectiveness. For example, suggest academic papers or recent case studies related to specific topics, or share relevant discussions including visual or multimedia material, or news articles.

➤ **Support for Q&A Sessions**

Students can ask ChatGPT questions about challenging concepts in lectures or textbooks to receive explanations. For example, students can clarify concepts in topics like service/production/operations management, inventory management, etc. While ChatGPT excels in providing information and answering questions, it may have limitations in replacing deep understanding of concepts or solving real-world problems that require domain-specific knowledge in OM. Therefore, it is recommended that instructors/lecturers use it as a supplementary tool to support Q&A sessions. In this connection, see the specific suggestions 3 below.

➤ **Efficient grading in large classes and midterm/final exam questions: Enhancing Educational Assessment with AI-based automatic grading tools**

Currently, ChatGPT doesn't directly provide grading features [Wikipedia, OpenAI], but there are various AI-based automatic grading tools available, such as Google Forms + Google Sheets, Crowdmark, Gradescope, and Blackboard Learn, though some are paid services.

➤ **Formulating midterm/final exam questions**

AI tool enhances educational assessments by assisting in the formulation of midterm/final exam questions. assisting in the formulation of midterm and final exam questions. It can generate and refine exam questions, ensuring relevance and comprehensiveness in testing students' knowledge.

➤ **Case Analysis and Solution Exploration**

Utilize ChatGPT to analyze real business cases and explore various solutions. For example, discuss with students how to address potential problems in OM using ChatGPT. See the specific suggestions 3 in Section 3.2 for details. These methods aim to facilitate individualized and interactive learning experiences for students through ChatGPT. Given the importance of connecting theoretical content with real-world cases in Business Administration and OM, leveraging ChatGPT to provide practical links could be highly effective.

Suggestion 2: Possible suggestions regarding students' performance evaluation

Several considerations need to be taken into account regarding the evaluation of students' performance:

➤ **Fairness Concerns:** Allowing students to use AI models like ChatGPT during exams can complicate the assessment of whether they are responding independently or receiving external assistance, potentially threatening the fairness of the exam in courses in OM.

➤ **Consistency in Assessment Purposes:** The purpose of exams is to evaluate students' understanding and learning in OM. Using AI models may hinder the ability to fulfill this purpose effectively.

From this perspective, face-to-face exams and closed-book formats are preferable because they can better assess a student's acquired knowledge and understanding, enabling them to validate their abilities and develop problem-solving skills.

Remark 5. In cases where a student cannot attend an face-to-face exam due to special circumstances, it's possible to implement technological methods to prevent or detect the misuse of AI models, maintaining exam integrity and ensuring fairness.

Due to the advantage of fostering students' foundational ability to make operational and managerial decisions using AI technology, a term project assignment and/or homework conducted at home can allow students to use ChatGPT, while supporting their learning and understanding by promoting the following methods:

- **Complexity and Depth of Problems:** Design assignments and tasks that are sufficiently complex and require deep understanding, making it challenging for students to simply rely on ChatGPT for summarized answers.
- **Assessment of Problem-Solving Skills:** Even if students use ChatGPT, incorporate methods that assess their problem-solving skills, and the process they use to arrive at solutions, thus demanding more than just providing answers.
- **Diverse Assessment Methods:** Implement various assessment methods regardless of ChatGPT usage, evaluating students' overall understanding and capabilities comprehensively. For example, practical assignments, discussions, and team projects can be utilized to assess learning outcomes holistically.

Suggestions 3: Specific methods for instructors/lecturers to instruct students on using AI.

We suggest guidance on specific methods for instructors/lecturers in OM to instruct students on using AI:

➤ **Strategies for Using AI in OM Learning**

1. Diverse Prompting:

- Input at least three different prompts for each OM topic.
- Example: “Explain the key components of supply chain management.” “What are the main differences between supply chain management before and after the COVID-19 pandemic?” “How does capacity planning affect operational efficiency?”

2. Comparative Analysis:

- Compare responses from ChatGPT with those from other AI tools.
- Example: “The impacts of globalization on supply chain management.”

3. Deep Dive and Follow-up Questions:

- Ask follow-up questions to delve deeper into specific aspects.
- Example: “Can you provide more detailed information on the advantages and disadvantages of using Six Sigma in quality management?”

4. Cross-Referencing with Academic Sources:

- Verify information with textbooks, academic papers, and credible online sources.
- Example: “Check the details of operations strategy against a reliable OM textbook.”

5. Practical Applications:

- Generate examples, case studies, or real-world applications.
- Example: “Provide several case studies of companies that have successfully implemented decarbonized supply chains in response to global climate change”

6. Critical Reflection:

- Reflect on the reliability, biases, and limitations of the information.
- Example: “What are the potential biases in the information provided by ChatGPT on the adoption of AI in OM?”

7. Interactive Study Sessions:

- Use ChatGPT as a study buddy to quiz on key OM concepts or simulate discussions.
- Example: “Quiz me on the key metrics used in performance measurement in OM.”

8. Collaborative Learning:

- Facilitate group discussions and brainstorming sessions with ChatGPT’s inputs.
- Example: “Suggest some innovative project ideas for a group assignment on decarbonized supply chains in response to global climate change.”

These strategies will help OM students effectively use ChatGPT to deepen their understanding and critically engage with their study materials.

Remark 6. To successfully integrate AI partially into education in the field of OM, addressing two key areas is crucial:

- **Technical Challenges:** Educators/lecturers/instructors and students may acquire the necessary technical knowledge and skills for effective AI integration. This may include learning new tools and platforms, which may require time and effort due to varying levels of technical proficiency among users. Continuous professional development in AI-related fields for educators/lecturers/instructors is necessary to adapt to these changes and capitalize on new opportunities.
- **Data Security and Privacy:** Operating AI-powered learning platforms in education requires secure management of personal information and learning data. This involves establishing robust privacy regulations, adopting enhanced security protocols, and potentially using data encryption technologies. Additionally, forming a dedicated education and technical support team can provide real-time assistance for users with technical questions and needs.

4. CONCLUSION

This paper has addressed the issues, suggestions, and challenges associated with the partial integration of AI into teaching courses on OM at HUFs. Adopting AI partially in the teaching and operations of courses in OM management offers many advantages, but it can also pose several challenges. Based on discussions in literature and examples, recommendations are provided for

enhancing AI literacy among students to effectively leverage AI. Additionally, suggestions, challenges, and considerations for instructors introducing AI into OM courses are presented. Future research should explore practical implementation strategies and ethical considerations within broader educational contexts.

Acknowledgment

This work was supported by Hankuk University of Foreign Studies (HUFS) Research Fund.

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