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Teacher–AI Collaboration in International Freight Forwarding Education: Dynamic Case Generation and Personalized Tutoring

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Abstract: The International Freight Forwarding industry has developed rapidly and this has created a widening gap between education and real-world practice. The course of International Freight Forwarding is facing three challenges: industry cases are updated too frequently, teachers are burdened by repetitive teaching preparations and resource production and large class size makes it difficult to implement personalized tutoring. The paper proposes an International Freight Forwarding teaching framework of Teacher–AI collaboration. The framework puts AI as an always-available intelligent assistant, responsible for standardized, repetitive and data-intensive tasks, while teachers as a higher-level teaching activity such as case discussions, critical thinking development, classroom interaction, ethical guidance and teaching innovation. Based on the framework, the paper designs an AI-supported teaching system and it includes four modules: the AI dynamic case generator, the AI teaching resource assistant, the AI learning analysis and personalized tutoring system, and the AI simulation training system. These modules form a continuous chain: case introduction - resource preparation - learning tracking - skill training - case update. The paper also discusses the implementation path, expected outcomes, teacher capacity building, and the broader generalizability of this model. The paper concludes the collaboration between teachers and AI can enable teachers to transform from task executors to learning facilitators and value creators, thereby enhancing the teaching efficiency and educational quality in International Freight Forwarding education.

Keywords: Teacher–AI collaboration, International Freight Forwarding, Dynamic Case Generation, AI Instructional Resource Assistant, AI Learning Analytics and Personalized Tutoring System, AI Simulation Training System.

1. Introduction

The course of International Freight Forwarding is a core professional course of Logistics Management major, Transportation Management major, etc. It is practice-oriented and its knowledge framework is closely linked to actual business operations, including route selection, fare calculation, bill of lading (B/L) management, customs declaration, cargo insurance, multimodal transport, and dispute resolution.

International Freight Forwarding industry is changing rapidly. The industry is highly sensitive to global economic conditions, geopolitical conflicts, shipping capacity, port congestion, exchange rates, environmental regulations, and trade policy. Such as the 2021 Suez Canal blockage incident, the 2024 Red Sea crisis, the international maritime organization adjustment of environmental rules, these events are valuable teaching cases because they reveal how theoretical concepts operate under uncertainty. However, it is difficuld for traditional textbooks to keep up with these changes.

Meanwhile, teachers in the field of International Freight Forwarding are confronted with a heavy amount of administrative work. They need to collect industry information, screen cases, prepare course materials, design exercises, grade assignments, answer recurring questions and provide feedback. In large class settings, these tasks become even more challenging. Students have varying levels of understanding of terms, documents, trade language, calculation methods and regulatory rules, and teachers often cannot provide continuous and personalized support to each student.

The core of the problem is not the insufficient effort of teachers, but the contradiction arising from the increasing demand for practice-oriented education and the limited time available for teachers. The solution is to design a division of labor between teachers and artificial intelligence (AI). The paper proposes a "teacher-AI" collaboration model. In the model, standardized, repetitive, and data-intensive tasks are AI's responsibility and personalized guidance, critical thinking, moral education, and teaching innovationa are teachers' focus.

Based on the analysis of the main difficulties in International Freight Forwarding teaching, the paper introduces the framework of collaboration between teachers and AI, and explains four teaching modules based on AI. The paper discusses implementation, evaluation, expected outcomes, and the improvement of teachers' capabilities, and finally summarizes the research content of the entire paper and proposes future research directions.

2. Problem Analysis: Structural Challenges in International Freight Forwarding Education

2.1. Lagging Industry Cases and the Gap between Teaching and Practice

The International Freight Forwarding industry is constantly evolving. Fees, port conditions, carrier policies and regulatory requirements may change within days or weeks. For example, during the Red Sea crisis in 2024, commercial ships were attacked. So major carriers such as Maersk and MSC had to

suspend Red Sea routes and reroute ships via the Cape of Good Hope. The original Suez Canal route from Shanghai to Rotterdam was approximately 10,500 nautical miles, with a voyage time of about 25 days while the Cape of Good Hope route extended to approximately 13,500 nautical miles, with a voyage time of 35 days. So at that period, the freight rate for cargo transportation from Asia to Europe surged from approximately USD 1,500 per FEU to more than USD 6,000 per FEU, an increase of about 300%.

Such events are ideal teaching cases and are able to connect route selection, cost analysis, risk management, contract performance, and customer communication. But traditional textbooks often take three to five years to update. When a case appears in the textbook, it may no longer reflect the current market conditions. Teachers who wish to use the latest cases must manually search multiple sources, verify the data, adjust the materials, and design discussion questions.This process consumes a great deal of teachers' time and is difficult to sustain over the long term.

This will cause difficulties in terms of cognition for the students. In classrooms, students learn standardized procedures and idealized cases, but when they encounter real problems - such as when a customer requests a change in the unloading port or the carrier charges congestion surcharges - they may lack practical judgment. The risk of the course lies in turning into the transmission of knowledge rather than the cultivation of professional skills. The drawback of such teaching is that it merely involves the transmission of knowledge rather than the cultivation of professional skills.

2.2. Heavy Transactional Workload and Fragmented Teaching Resources

The teaching of international freight forwarding requires professional course content design and authentic and effective teaching materials. Teachers must explain industry terms, document formats, international conventions, and operational rules, and need to prepare courseware, glossaries, case materials, practice questions, and assessment questions. Although these tasks are necessary, many of them have repetitive and standardized characteristics.

For example, when teaching bills of lading, the teacher will explain the differences between straight B/L, order B/L, bearer B/L, clean B/L, unclean B/L, shipped on board B/L, received-for-shipment B/L, and electronic B/L. The teacher need connect these concepts to real documentation, legal rules, and business scenarios. For air waybills, customs declarations, certificates of origin, insurance policies, and letters of credit the teacher need to do similar preparation.

Much of this work has low creative value but requires extremely high accuracy. Any small error in terminology or document format will mislead students. As teachers have to maintain a high level of concentration, their energy is further depleted. As a result, the time available for designing classroom interaction, providing personalized feedback, conducting reflective teaching, and innovating teaching methods is reduced. Such teaching process may become resource-intensive but lacks interaction.

2.3. Large Classes and the Difficulty of Personalized Tutoring

In China, International Freight Forwarding courses are usually taught in large classes of 70 to 80 or more students. The difficulties faced by the students are diverse: some have trouble understanding professional terms; some are confused about the functions of different documents; some have difficulties with freight calculations; some misunderstand the risk transfer under trade terms; and some are unable to apply international rules to complex situations.

Teachers' tutoring time is limited. A five-minute break is not enough to answer dozens of questions, and the regular office Q&A sessions each week are difficult to cover all the students. Although online question-and-answer can overcome the limitations of time and space, one-on-one responses still consume a great deal of time. In large-class teaching, teachers often adopt a "balancing both ends" strategy, focusing on the weakest and most active students while neglecting the different learning needs of the middle group.

The more of these problems accumulate, the greater impact they will have on students' learning. Because the knowledge of international freight forwarding is progressive, if students cannot understand basic concepts such as the legal functions of B/L, then they will encounter difficulties in subsequent aspects such as review of credit documents, risk allocation and dispute resolution. Confusions that are not resolved in the early stage may lead to students' frustration, decline in their learning motivation, and decrease in their learning effectiveness.

In conclusion, these three issues have a common root: teachers are confined to standardized, repetitive tasks that heavily rely on data. Tracking industry information, preparing teaching resources, answering common questions, and grading basic assignments are all essential, but these tasks fail to fully reflect the professional value of teachers. These tasks consume a lot of teachers' time, which could otherwise be used for instructional design, classroom interaction, personalized care, and teaching research - the "high-value time". Therefore, the solution is to redefine the boundaries of teachers' work. The tasks that can be standardized and automated should be handled by AI and tasks that require creative value creation should be carried out by teachers. This is the practical foundation of the "teacher-AI collaboration model" in the paper.

3. Teacher–AI Collaboration: Conceptual Framework

3.1. Core Concept

A dual perspective collaborative model is established by the conceptual framework of teacher-AI collaboration: the standardized tasks are handled by AI and the personalized education is focused by teachers. AI is not considered to replace teachers, nor is viewed as an optional tool. Instead, AI is regarded as an intelligent partner in order to enhance teachers' capabilities and improve teaching efficiency, as shown in Figure 1.[1]

The collaboration between AI and teachers is based on complementary strengths. These high-speed information processing, rule-based execution, data analysis, and repetitive tasks are more suitable to be completed by AI and professional judgment, emotional connection, value guidance, creative thinking, and situational adaptation are better done by teachers. When these advantages are combined, the result may exceed the sum of their individual contributions.

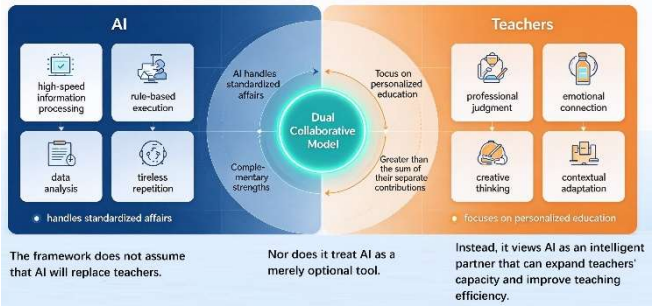


Figure 1. Teacher–AI Collaboration: the Proposed Teaching Framework

3.2. The Role of AI: An Always-Available Intelligent Assistant

AI is regarded as an always-available intelligent assistant. Its responsibilities are inclued in four areas as shown in Figure 2.

First, AI supports industry tracking and case generation. AI can monitor real-time freight rates, port congestion situations, carrier announcements, shipping alliance changes and regulatory policy updates. It filters information according to teaching objectives and generates structured teaching cases with real data, timelines, and discussion questions.



Figure 2. Four Core Responsibilities of AI as an Always-Available Intelligent Assistant in Teaching

Second, AI supports instructional resource preparation. It helps generate courseware frameworks, terminology explanations, exercises, assessment items, and case-based questions. It also maintains a terminology bank to ensure consistency and accuracy.

Third, AI provides 24/7 personalized tutoring. Students can ask questions at any time. AI answers based on the course knowledge base and flags complex questions for teacher follow-up.

Fourth, AI supports grading and learning analytics. It grades objective questions and basic subjective tasks, generates personal error notebooks, class heatmaps, and diagnostic reports. These data help teachers make evidence-based instructional decisions.

These tasks are characterized by high frequency, repeatability, and data intensity. They require accuracy but not necessarily human creativity or emotional judgment. Delegating them to AI does not mean that AI is superior to teachers in every respect. It means that AI can perform these tasks more efficiently, thereby freeing teachers for higher-value work.

3.3. The Role of Teachers: Returning to the Essence of Education

With AI handling standardized tasks, teachers can focus on four core responsibilities as shown in Figure 3.[2]

Firstly, teachers guide students to engage in case discussions and cultivate their critical thinking skills. Although AI can generate cases, it cannot replace teachers in designing questions and stimulating students to think deeply. Teachers help students shift from "what happened" to "why it happened", "how to evaluate", and "what would you do".

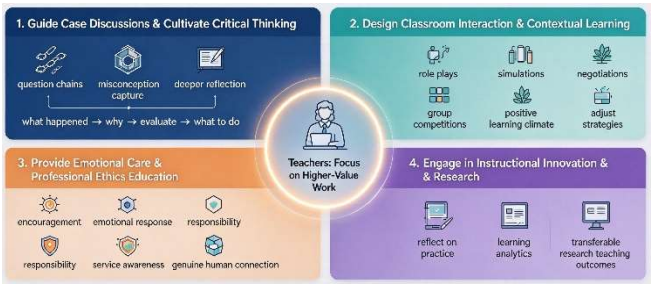


Figure 3. Four Core Responsibilities of Teachers for Higher-Value Work in the Teaching Framework

Secondly, teachers design classroom interactions and contextualized learning. Although AI can provide resources, the soul of the classroom lies in real interaction. Teachers design activities such as role-playing, simulation exercises, group competitions, and negotiation and communication to create a positive learning atmosphere and adjust teaching strategies according to the needs of students.

Thirdly, teachers provide emotional support and conduct professional ethics education. Education is not merely the transmission of knowledge; it is also about teachers helping students grow. Teachers encourage students and respond to their psychological needs. These effects rely on the genuine interpersonal relationship between teachers and students and cannot be replaced by technology.

Fourth, teachers actively participate in teaching innovation and research. AI can assist teachers in their daily teaching, but the true driving force for innovation comes from the teachers themselves. Teachers reflect on their teaching practices, transform learning analysis into research questions, and develop transferable teaching outcomes.

3.4. Operational Logic: Division, Synergy, and Teacher Development

Teacher–AI collaboration is not a mechanical division of labor, where humans handle half of the work and machines handle the other half. The collaboration is dynamic, interdependent, and follows a spiral upward trend – that is, a spiral development. Its operation can be clarified by three principles as shown in Figure 4.[1,2]

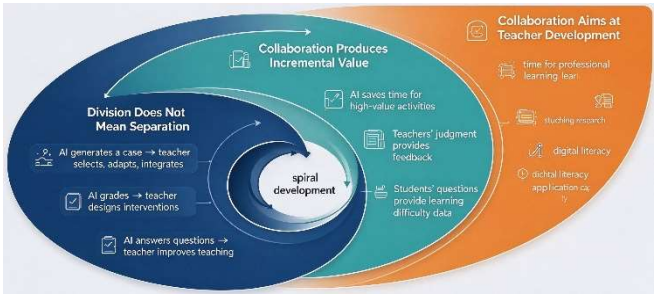


Figure 4. Operational Logic of Teacher–AI Collaboration: Division, Synergy, and Teacher Spiral Development

First, division does not mean separation. While AI and teachers have distinct functions, they are closely intertwined in practice. AI generates examples; teachers, on the other

hand, select, adjust and integrate them based on the characteristics of students. AI grades assignments; teachers use feedback to design classroom intervention measures. AI answers questions; teachers identify frequently asked questions and improve teaching.

AI enables teachers to devote more time to high-value teaching activities. The teachers' professional judgment and teaching practices, in turn, provide feedback and data for the optimization of AI. When teachers select, modify and supplement the teaching cases generated by AI, they are actually effectively training the system to better understand the course requirements. When students ask questions in the AI-assisted system, they also provide valuable data on learning difficulties.

Third, collaboration aims at teacher development. The ultimate goal is not to have AI undertake more tasks, but to help teachers become more efficient. By delegating routine tasks to AI, teachers can gain more time and cognitive resources for professional learning, teaching research, and student care. At the same time, the use of AI tools can also enhance teachers' digital literacy and technical application skills.

4. AI-Enabled Teaching System: Four Modules

The proposed system follows the entire teaching process: preparation, classroom teaching, after-class tutoring and assessment and consists of four independent but interrelated modules that form a closed loop as shown in Figure 5.

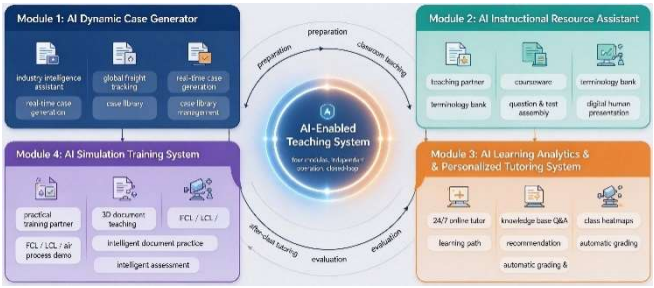


Figure 5. AI-Enabled Teaching System: Four Functional Modules for the Whole Teaching Process

4.1. Module 1: AI Dynamic Case Generator

4.1.1. Function and Positioning

The AI dynamic case generator acts as an "industry intelligent assistant" for teachers. It keeps track of ongoing changes across worldwide freight forwarding, picks out events suitable for classroom use, and produces up-to-date teaching cases. With this tool, educators no longer wait years to refresh their case materials; updates can be finished within weeks, or sometimes only days.[3]

4.1.2. Core Technology

The module comprises three core technical components: large language models, real-time search web crawling, and retrieval-augmented generation. Draft case content according to teaching requirements is interpreted by the large language model. The latest industry news and operational data are crawled by real-time search. Against reference materials, the retrieval-augmented generation technique grounds outputs and boosts both factual accuracy and alignment with teaching contexts.[3,6]

4.1.3. Key Functions

The module has four functions:automatic industry tracking (collecting rates, port congestion, carrier notices, alliance updates, and policies, saving over 80% of search time), intelligent case generation (creating adjustable cases with background, data, timeline, questions, and prompts from a topic), structured case transformation (turning raw cases into ready-to-use materials with consistent terms and exercises, cutting preparation from hours to minutes), and historical case library management (classifying cases by date, topic, difficulty, and type for easy retrieval and reuse).

4.1.4. Illustrative Scenario: The 2024 Red Sea Crisis

The module's value is demonstrated by the 2024 Red Sea crisis: real-time events and rate surges from about USD 1,500 to over USD 6,000 per FEU were tracked by the system and key route-selection data were retained. The case "Route Decision under the Red Sea Crisis: Balancing Cost and Time" is generated and covers background, data, cost, time–cost trade-offs, and risk prevention, with adjustable difficulty and no need for regeneration. It took only several mimutes for preparation, and helps teachers shift from information collection to classroom guidance and reusable resources.

4.2. Module 2: AI Instructional Resource Assistant

4.2.1. Function and Positioning

AI instructional resource assistant acts as a teaching partner. It facilitates in-class interaction and standardized teaching by assisting with courseware development, professional terminology management, exercise design, and academic assessment arrangement.

4.2.2. Core Technology

The module adopts a combination of large language technology, speech synthesis and standardized terminology management. These techniques help produce high-quality teaching content, enable virtual digital human teaching demonstrations, and maintain uniform expression and accuracy throughout all teaching materials.[4]

4.2.3. Key Functions

It provides:

(1) Intelligent course ware generation. After teachers input teaching outlines or key knowledge points, the system can output structured frameworks with highlighted professional terms. This function cuts roughly 60 percent of the time spent on lesson preparation.

(2) Terminology bank management. The library spans transportation, trade clauses, shipping documents, insurance and customs rules. It supports consistency verification, term definitions, practical examples, difficulty tagging and student learning tracking.

(3) Intelligent question generation and test assemblyThe system can produce multiple-choice, blank-filling, document-based and case-style questions. It also assembles exam papers according to knowledge scope, difficulty and question types, complete with reference answers and grading rubrics.

(4) Digital human presentation. Virtual presenters explain terminology, document fields and operational workflows, which relieves teachers from repeatedly delivering identical explanations.

4.2.4. Application Example

Taking the teaching unit concerning the categories and practical functions of bills of lading as an example, the system can independently develop matched courseware and targeted exercises covering various bill types, including direct, transshipment, clean, unclean, shipped, received-for-

shipment, order, straight, and bearer bills of lading. In classroom teaching, digital human tools interpret the professional definitions and attributes of these documents. Teachers only need to monitor the learning process and offer targeted supplementary explanations. This approach eliminates redundant repetitive teaching work and greatly enriches classroom interactive teaching sessions.

4.3. Module 3: AI Learning Analytics and Personalized Tutoring System

4.3.1. Function and Positioning

The module works both as a round-the-clock online tutor and a learning analytics tool. It makes personalised support feasible even for large class sizes: students receive instant assistance, while instructors gain visualised learning data. This setup allows educators to deliver tailored education at scale.[5,6]

4.3.2. Core Technology

The module combines large language models, knowledge graphs and learning analytics. These tools help interpret student queries, organise course concepts into clear structures, and extract valuable insights from learners' behavioural data.

4.3.3. Key Functions

The module offers four functions: 24/7 tutoring that flags complex questions and cuts routine tutoring by about 70%[6]; personalized learning paths based on mastery and gaps[7]; class heatmaps showing mastery, common errors, groups, and trends; and automated grading and diagnosis that generates error logs, heatmaps, and cause reports.

4.3.4. Application Example

When a student asked about straight vs. negotiable B/L, AI explained the difference and assigned two exercises; the platform showed only 62% class mastery on bill types with this as the top error, so the teacher adds a 10-minute comparison that raised mastery to 85%.

4.4. Module 4: AI Simulation Training System

4.4.1. Function and Positioning

A hands-on training companion for learners is acted by the AI-powered simulation training system. The system helps address the disconnect between textbook knowledge and real operations. Core freight forwarding competencies are built by limited training resources and delivering immersive, interactive tools for learners.

4.4.2. Core Technology

The module includes 3D visualisation, large language models and interactive simulation. Virtual models of ports, container yards, warehouses, airports and shipping documents are built by the 3D visualisation. Assessment and generate targeted feedback are handled by large language models. Step-by-step guided practice in real time is delivered by interactive simulation.

4.4.3. Key Functions

The module offers four functions: 3D document teaching with interactive models, fields, rules and common errors; 3D process demos for FCL, LCL, air and multimodal transport; interactive document drills with instant checks, error highlights and guidance; and adaptive evaluation with tailored tasks, adjustable difficulty, and skill/error feedback.

4.4.4. Application Example

For example, students handle a Hangzhou–Marseille silk shipment under CIF with a letter of credit(L/C) in an ocean FCL export simulation. L/C requires a shipped-on-board and clean B/L; If a wrong "To order of shipper" entry in Notify Party results in immediate correction. If the report shows 92% document accuracy, 88% process compliance, and 75% emergency response, the system will recommend contingency practice; the teacher then finds nearly 40% misunderstand B/L issuance timing and can give targeted explanation.

5. Implementation, Evaluation, and Discussion

5.1. Course Design and Teaching Process

The complete teaching workflow can be fit into by the AI-powered teaching system:

Before lessons, differentiated preview tasks using learning analytics are assigned by AI. Student questions around the clock are responded by the embedded AI tutor. Meanwhile, preview data and fine-tune their lesson plans can be examined by teachers accordingly.

During class, diverse teaching activities are supported by the system. In AI-augmented lectures, core concepts are introduced by teachers while relevant rules, practical cases and term definitions are supplied by AI. For AI scenario simulation, unexpected events including route rerouting, port strikes and customs checks are dealed by learners. Students use AI to look for solutions, calculate costs and draft communication strategies. Document practice and instant feedback are also supported by AI after students finish paperwork. For case analysis, the tool to look up legal clauses and assess liability can be used by learners. In project-based learning, a virtual client with changing demands is AI's work. Students develop transport solutions to meet these requirements.

After class, tutoring services can be delivered by AI, individual learner profiles can be built by AI and tailored learning materials can be suggested by AI. Targeted support can be arranged and their teaching strategies can be refined if teachers leverage analytical reports.

5.2. Expected Outcomes

Tangible benefits for teachers, teaching quality and student learning are delivered by the framework.

For educators, by using AI tools lesson preparation workload can be cut by over 40% and routine administrative work can be reduced by 35%. This helps teachers to focus more on curriculum design, targeted student guidance and educational research. Teachers can be shifted from traditional knowledge lecturers to professional mentors in intelligent teaching scenarios with continuous practical training.

In terms of teaching effectiveness, the case update cycle is shortened from several years to mere weeks or days by using the system, so course content can be kept closely aligned with real industry practices. It also enriches teaching resources and ensures over 95% consistency in professional terminology. Meanwhile, practical training coverage is fully upgraded from below 30% to 100%, greatly bridging the gap between theoretical learning and operational practice.

For learners, AI enables full-coverage personalized tutoring, lifting the original coverage rate from less than 10% to 100%. Immersive 3D visualization and interactive simulation simplify complicated operational processes. As a result, students' document filling accuracy is expected to improve by 40%, operational process mastery by 50%, and overall course satisfaction will exceed 95%.[7]

5.3. Teacher Capacity Building

Regarding teacher capacity building aspects, the paper puts forward three-pronged development pathway: (1) Structured training should be tailored to different teacher groups. New teachers need hands-on training for AI tools, smart curriculum design and custom agent setup. Experienced teacher need integrating AI into subject teaching, developing in-depth cases and carrying out research with AI assistance. all teachers need training covering AI literacy, data security and ethical norms . (2) Scenario-driven practice embeds AI within everyday teaching routines. AI is built into lesson planning, assignment design, marking and learning analytics. Teachers do not have to study AI as a separate subject. Teachers also exchange practical know-how by open teaching demonstrations and research communities. (3) Sustained support covers incentives, technical help and resource sharing. Awards for AI-enabled teaching innovation can be set up by educational institutions through incorporating AI proficiency into staff evaluation. Dedicated technical assistance are offered , and build shared resource libraries are built. These libraries may store courseware templates, case classification rules, agent settings and prompt examples.

5.4. Discussion: Innovation and Transferability

The framework has five core innovations.

First, it establishes a working model for teacher-AI collaboration. Two common misconceptions are rejected by the framework, one is that AI will replace teachers and the other is that AI is merely an optional add-on tool. The framework sets clear role division: AI takes charge of standardised tasks and teachers concentrate on personalised instruction.[1,2]

Second, it develops subject specific scenarios tailored to international freight forwarding. It covers 3D document display, terminology management, simulation training and learning analytics.

Third, it creates modular, updatable teaching materials. AI keeps pulling real time industry updates, freight indices and policy adjustments to produce short, timely micro cases are available. It solves the problem that traditional textbooks quickly fall behind industry realities.

Fourth, it forms an integrated ecosystem with AI-powered assessment and teaching resources. Process-oriented evaluation, individual learner profiles, AI-assisted case questions and collaborative projects linking academia and industry are all supported by the system.

The framework remains conceptual at this stage, and all projected results need empirical verification. Quasi-experimental designs could be adopted in follow-up work to compare AI-enhanced teaching with conventional classes, learning performance can be measureed and feedback from both students and teachers can be collected.

6. Conclusion

In this paper, a teacher-AI collaboration framework for International Freight Forwarding instruction is put forward. It addresses three persistent teaching challenges: outdated industry cases, heavy routine workloads, and the difficulty of delivering personalised support within large classes. In the framework, AI is treated as an always-on assistant for standard, repetitive and data-heavy tasks, freeing teachers to focus on case discussions, critical thinking activities, classroom interaction, learner support and instructional innovation.

The paper develops four AI-driven modules: a dynamic AI case generator, an AI teaching resource assistant, a learning analytics and personalised tutoring system, and an AI simulation training platform. A closed workflow linking industry cases, teaching materials, learner tracking, practical skill training and ongoing case updates is created. How AI converts real-world industry events into up-to-date teaching cases and how teachers use analytics to design targeted classroom interventions are illustrated by the 2024 Red Sea crisis case.

AI cannot replace teachers and insteadly AI help teachers from low-value repetitive labour. By Teacher–AI Collaboration, teachers can refocus on the core of education. International Freight Forwarding teaching will be more current, practical, personalised and effective by combining AI's computing capability with teachers' professional judgement and human care makes . This model will be tested empirically in further research, polished by the AI tools, and explored whether the approach can be adapted for other applied courses.

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