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Generative AI-Driven Dynamic Generation and Optimization of Case Teaching Resources for International Trade

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Abstract: Traditional case teaching in international trade is constrained by slow updating, fragmented business materials, uniform task difficulty, and weak connections with changing trade scenarios. Generative artificial intelligence (GenAI) offers a way to transform static cases into adjustable teaching resources. This study adopts literature analysis, instructional design research, and scenario-based case analysis. Taking the export of automated packaging equipment from a Chinese manufacturer to a Malaysian buyer as an illustrative case, it proposes a framework consisting of goal anchoring, constrained generation, teacher verification, layered task delivery, learning-evidence collection, and iterative optimization. The framework generates interconnected materials such as inquiries, quotations, contracts, documentary credits, commercial documents, role instructions, and risk events, while retaining teachers' control over professional accuracy and pedagogical suitability. A human-AI collaborative quality mechanism is established to address factual accuracy, rule compliance, process consistency, difficulty alignment, and traceability. Rather than claiming experimentally verified learning gains, the paper clarifies the instructional value, operating conditions, and governance boundaries of the model. GenAI should be positioned as a resource co-creation and variation engine rather than an autonomous teacher. The framework provides a feasible reference for improving the timeliness, authenticity, differentiation, and sustainability of case teaching resources in applied international trade courses.

Keywords: Generative artificial intelligence; International trade; Case teaching; Dynamic teaching resources; Human-AI collaboration

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1. Introduction

International trade courses require students to connect theories and rules with market inquiry, price calculation, contract negotiation, payment, transportation, documentation, and dispute handling. Case teaching is therefore important, but many cases remain unchanged for years, contain only a short narrative, or provide isolated documents that cannot support a complete transaction. Once freight conditions, exchange rates,

product requirements, or customer needs change, teachers must revise multiple materials manually. The high maintenance cost often causes resources to lag behind practice.

Generative artificial intelligence (GenAI) can produce texts, dialogues, tables, document drafts, and alternative scenarios from structured prompts. Existing studies identify its potential to assist teachers in material development, feedback, and differentiated learning, while warning of factual errors, fabricated information, bias, and academic-integrity risks [1–4]. UNESCO consequently advocates a human-centered approach in which pedagogical design, privacy protection, validation, and human agency remain essential [1]. Thus, the value of GenAI lies not in replacing teachers, but in expanding their capacity to create and update resources under explicit constraints.

For international trade teaching, the central issue is how to generate a coherent resource set, verify trade-rule accuracy, and use learning evidence to guide revision. This paper develops a dynamic generation and optimization framework and demonstrates it through an illustrative machinery-export case. No questionnaire, experiment, or achievement data are fabricated; the purpose is to offer an instructional design model for subsequent classroom testing.

2. Problems in traditional case teaching resources

2.1. Static resources and changing trade contexts

A conventional case is usually a stable package of background information, questions, and standard answers. It is easy to reuse but difficult to update. In actual transactions, a change in delivery time, port, freight, insurance, exchange rate, or payment term may alter the whole decision chain. Static cases seldom show these interacting variables, so students may know individual rules yet struggle to apply them under changing conditions.

2.2. Fragmented documents and weak process connections

International trade operations are document-driven. An inquiry affects the quotation; the quotation affects the contract; the contract affects the documentary credit; and the credit affects invoice, packing, transport, and presentation requirements. Classroom materials collected from different sources may contain inconsistent names, quantities, dates, currencies, ports, and clauses. For letter-of-credit cases, materials must also reflect the documentary nature of the transaction and the applicable UCP 600 rules [7].

2.3. Uniform tasks and excessive maintenance costs

Students differ in language proficiency, calculation ability, rule comprehension, and business judgment. One task may be too easy for some students and too difficult for others, while temporary oral adjustments are difficult to preserve. Meanwhile, producing a complete case requires product, pricing, logistics, settlement, documentation, and risk knowledge. Without standardized prompts, review records, and version control, revisions depend heavily on individual teachers and become difficult to share.

3. Framework for dynamic generation and optimization

The proposed model contains six stages: teaching-goal anchoring, constrained generation, teacher verification, layered delivery, evidence collection, and iterative optimization. Its logic is “teacher-defined objectives–AI-assisted production–professional review–classroom use–evidence-based revision,” rather than direct AI output

to students.

3.1. Teaching-goal anchoring and generation constraints

The teacher first converts course outcomes into a case specification identifying the transaction stage, target knowledge, expected skills, product, market, learner level, required documents, and prohibited content. A quotation task may target export cost calculation, Incoterms selection, and business-email writing; a documentary-credit task may target discrepancy identification and amendment advice.

Prompts should contain four constraint groups. Factual constraints define countries, product parameters, currency, quantity, and transport mode. Rule constraints require alignment with specified standards such as Incoterms 2020 and UCP 600 [6,7]. Pedagogical constraints define difficulty, task type, and expected output. Consistency constraints require names, dates, amounts, ports, and terms to remain aligned across all documents.

3.2. Multi-layer resource generation

GenAI can produce a resource chain rather than a single case text. The basic layer includes company profiles, product information, customer inquiry, and transaction goals. The operational layer includes quotation sheets, cost data, contract drafts, documentary-credit clauses, invoice templates, packing lists, and booking information. The interaction layer provides role cards for exporter, importer, bank, carrier, and insurer. The variation layer introduces exchange-rate movement, cost increases, shipment delays, document discrepancies, or changed buyer requirements.

Items should be generated in batches with a shared case code and variable table. Each item records its prompt, version, date, and review status. This traceability is necessary because GenAI output may appear authoritative even when its basis is uncertain [2,4,5].

3.3. Teacher verification and layered delivery

Teacher review is the quality gate. Verification covers factual accuracy, rule compliance, process consistency, pedagogical alignment, and language quality. AI may assist with cross-document comparison, but the teacher approves, revises, or rejects each item. High-risk content, including legal interpretations, sanctions, customs requirements, and banking practice, must be checked against authoritative sources. Human judgment therefore remains central [1,3].

After approval, one case can be converted into three levels. The foundation level supplies structured data and asks students to complete a quotation or identify obvious discrepancies. The advanced level removes guidance and requires comparison, justification, or amendment advice. The challenge level introduces conflicting objectives or uncertain information and asks students to negotiate, evaluate risk, and defend a decision. Parallel versions can change quantities, ports, or risk events while retaining the same learning outcome.

3.4. Learning evidence and iterative optimization

Optimization should rely on evidence rather than automatic personalization. Evidence may include calculation errors, misunderstood clauses, incomplete documents, weak justifications, frequent questions, and teacher observation. These data are summarized without unnecessary personal information and converted into revision instructions.

If students confuse cost responsibility with risk transfer under a "C" term, the next version can add a CIP-DAP comparison, a delivery timeline, and a counterexample. If they overlook a late-shipment clause in a documentary credit, the system can generate a focused discrepancy exercise with similar but different dates. The cycle is "error classification–cause judgment–resource adjustment–renewed use," with the teacher deciding whether the problem arises from the learner, case design, or generated material.

4. Illustrative case: Export of automated packaging equipment to Malaysia

4.1. Base scenario

The fictional exporter is a machinery manufacturer in Henan, China. A Malaysian food-processing company inquires about one automated packaging line consisting of a filling unit, sealing unit, conveyor, and control system. The buyer requests a US-dollar quotation, delivery to Port Klang, installation guidance, and payment by documentary credit. The case does not represent any real enterprise or classroom dataset.

Machinery export is suitable because it combines product parameters, customized packing, inland and sea transport, installation obligations, payment security, and after-sales communication. It also requires students to distinguish matters regulated by Incoterms from issues that must be written separately into the sales contract, including commissioning, warranty, training, and technical service.

4.2. Resource generation and professional review

In the first round, the model produces a buyer inquiry, exporter profile, equipment specifications, production cost data, inland transport cost, freight, insurance, and a currency assumption. Students calculate a quotation and compare FCA, CIP, and DAP. The teacher checks the cost structure and confirms that the named places and transport mode are compatible with the chosen terms. Incoterms 2020 contains 11 terms and allocates obligations concerning delivery, cost, risk, and insurance; it should not be treated as a complete sales contract [6].

In the second round, the approved quotation is converted into a contract draft and a simulated documentary credit. The model includes controlled discrepancies, such as an inconsistent latest shipment date, an overly strict document description, or a conflict regarding partial shipment. Students identify the discrepancies and draft an amendment request. The teacher ensures that the exercise reflects documentary examination and does not present invented banking rules as authoritative [7].

4.3. Progressive variation and differentiated tasks

The foundation task asks students to complete a quotation table, select a reasonable term, and reply to the inquiry. The advanced task adds a freight increase and a request for a longer quotation-validity period; students revise the price and explain the consequences. The challenge task adds a component shortage while the credit's latest shipment date remains unchanged. Students act as exporter, buyer, and bank representatives to decide amendment priorities and communication order.

Further variants may add an installation engineer's travel cost or change the destination from Port Klang to an inland factory. Students then reconsider price structure, named place, and logistics responsibilities. Controlled changes turn one base case into a family of cases, reducing repetitive preparation while preserving common objectives.

4.4. Optimization without fabricated effect data

Because no real classroom data are used, this paper does not claim improved scores or learning outcomes. It demonstrates how possible evidence categories would guide revision. A calculation error would trigger a scaffolded cost template; an Incoterms misunderstanding, a responsibility matrix; a document inconsistency, a checking list; weak negotiation language, role-specific phrase support; and excessive AI dependence, an oral defense or process-log requirement.

Assessment should compare student reasoning with approved case logic rather than simply compare final text with an AI answer. Students may submit prompts, revisions, sources, and decision explanations. This makes AI use visible and shifts assessment from polished output to verifiable reasoning and professional judgment.

5. Human-AI collaborative optimization mechanism

The teacher is responsible for objectives, authoritative knowledge, approval, assessment, and ethical decisions. GenAI handles drafting, variation, formatting, language adaptation, and preliminary consistency checks. Students remain responsible for analysis, verification, negotiation, decision-making, and reflection. This division avoids both rejecting useful technology and allowing it to replace disciplinary thinking.

A reusable rubric can rate each resource on accuracy, consistency, authenticity, difficulty alignment, openness of decision-making, and traceability. Any serious rule error leads to rejection regardless of the total score. Approved resources enter a library with version numbers and change logs. The library can be organized by transaction stage, product, market, payment method, risk type, and difficulty. Teachers retrieve a verified core and request limited variations instead of regenerating everything. This "verified core plus controlled variation" model is safer and supports team teaching.

6. Risks and governance strategies

The first risk is hallucination: fluent output may contain incorrect rules, fictitious documents, or unreasonable calculations. Mandatory teacher verification and authoritative sources are therefore required. The second risk is internal inconsistency, which can be reduced by shared variable tables, templates, and cross-document checks. The third is homogenization; teachers should vary industries, markets, conflicts, and decision goals.

Privacy and intellectual-property risks also require attention. Real customer data, contracts, student identities, and confidential enterprise information should not be entered into public systems without authorization. Cases should use anonymized or synthetic data. Student dependency is another concern: when AI completes calculations and explanations, learners may bypass the cognitive process. Source checking, error diagnosis, prompt disclosure, oral questioning, and in-class decision tasks should therefore be included.

Finally, accountability must be explicit. AI-generated resources do not transfer responsibility away from teachers or institutions. Course teams should define approved uses, prohibited data, review levels, retention rules, and disclosure requirements. These measures accord with calls for teacher training, redesigned assessment, and clear GenAI policies [1,4,8].

7. Conclusion

GenAI provides an opportunity to move international trade case teaching from static presentation to controlled,

iterative resource construction. The proposed framework connects goal anchoring, constrained generation, teacher verification, layered delivery, evidence collection, and iterative optimization. The machinery-export case shows how inquiries, quotations, contracts, documentary credits, documents, role tasks, and risk events can form a coherent resource chain.

The central principle is that GenAI should expand teachers' design and updating capacity, not replace disciplinary judgment. Practical value depends on authoritative verification, clear responsibility, traceable versions, privacy protection, and assessment that preserves student reasoning. As an instructional design and scenario analysis, this study has not empirically tested effectiveness. Future research should apply the framework in real courses and examine resource-update efficiency, decision quality, differentiated learning, and transfer of learning.

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