Article

TaBLE Based AI-Assisted Project Negotiation Case Design: A Project Management Course Study

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Abstract: The number of university graduates in China has risen steadily in recent years, placing considerable pressure on the highly competitive labour market. Consequently, many students struggle to find suitable employment after graduation, highlighting a significant gap between academic preparation and industry expectations. Employers increasingly value practical knowledge application and essential soft skills, such as effective communication, critical thinking, and adaptability. Yet, most traditional classroom instruction remains predominantly lecture-based, offering limited opportunities for students to develop the dynamic competences required in the modern workplace. To address this critical educational gap, this study designs an innovative case simulation grounded in the Team-Based Learning and Evaluation (TaBLE) framework, seamlessly integrating core project management concepts and advanced negotiation principles. The proposed simulation is systematically organised into five distinct stages following the rigorous TaBLE structure, ensuring comprehensive student engagement. Throughout the intervention, students work collaboratively in groups through a realistic project bidding and negotiation exercise. By actively participating in this immersive environment, learners are compelled to apply the theoretical knowledge they have acquired to solve complex, real-world problems. This experiential learning approach is designed to significantly strengthen both their practical application skills and their interpersonal communication and negotiation abilities. Ultimately, the findings suggest that incorporating AI-assisted, TaBLE-based simulations into higher education curricula can effectively bridge the gap between theoretical learning and practical execution, thereby enhancing overall student employability and readiness for the professional project management landscape.

Keywords: higher education; project management; soft skills; employability; case study; team-based learning

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1. Introduction

1.1. Soft Skill and Employability

The rapid growth of higher education systems across Asia has resulted in a significant increase in the number of graduates entering the job market annually. This surge has intensified competition among job seekers, prompting employers to adopt more selective hiring practices. While technical expertise remains a fundamental requirement, there is a growing emphasis on candidates' ability to apply knowledge in practical scenarios and demonstrate strong interpersonal skills, particularly in communication. For students pursuing business-related disciplines, these soft skills often play a pivotal role in determining success during interviews and in the early stages of their careers. Despite this, traditional teaching methods in higher education continue to rely heavily on lecture-based formats. Such approaches are effective for disseminating theoretical knowledge but fall short in providing students with opportunities to actively engage in activities that develop their ability to articulate arguments, respond effectively to questions, or collaborate with others in a professional setting [1]. This disconnect between the skills employers prioritize and the competencies fostered through conventional education

underscores the need for targeted interventions. Over the past decade, a persistent gap has been observed between the preparation of students in soft skills and their overall employability. This highlights the necessity for the development of specialized courses and programs aimed at bridging this divide, ensuring that graduates are better equipped to meet the evolving demands of the modern workforce.

1.2. Case Study Theories Design

Several established theoretical frameworks have been instrumental in shaping classroom case-based teaching methodologies. Constructivism, introduced in the late 20th century, emphasizes the importance of learners actively engaging with content in authentic contexts to construct their own understanding [2]. This approach underscores the value of experiential learning and situational problem-solving as key components of knowledge acquisition. Outcome-Based Education (OBE) further advanced this perspective by focusing on the alignment of instructional objectives with clearly defined and measurable learning outcomes, ensuring that teaching strategies are purposefully designed to achieve specific educational goals. Cooperative Learning, which gained prominence shortly thereafter, highlights the significance of small-group interactions, where individual accountability and collaborative efforts combine to enhance both personal and collective learning experiences. More recently, the Presentation-Assimilation-Discussion (PAD) Class model introduced a structured approach to case teaching, dividing the process into distinct stages that facilitate both individual internalization of concepts and collaborative discussions to deepen understanding. Building on these foundational theories, the Team-Based Learning and Evaluation (TaBLE) case method was developed as a comprehensive framework that integrates multiple phases of learning. This method includes pre-class individual preparation, individual readiness assurance, team readiness assurance, team application and cross-group discussion, and post-class individual reflection [3]. Each phase is designed to embed assessment mechanisms and foster team consensus, ensuring a holistic learning experience. This study adopts the TaBLE framework due to its explicit procedural structure, which aligns seamlessly with the staged design of the negotiation case. By incorporating pre-class preparation, in-class group discussions, cross-group negotiations, and post-class reflections, the framework provides a robust model for integrating AI tools while simultaneously assessing both technical competencies and soft skills, such as teamwork and communication.

2. Method

2.1. TaBLE Theory

In Table 1, the TaBLE framework organizes case teaching into five sequential stages, beginning with individual preparation prior to class and concluding with individual reflection after class. This structured approach emphasizes the importance of personal accountability both before and after group discussions, rather than focusing solely on collaborative activities during class sessions. The framework introduces two pivotal transitions in the learning process. The first transition involves moving from merely understanding computational methods to developing the ability to articulate the underlying reasoning behind those methods. This shift encourages deeper cognitive engagement and fosters critical thinking skills. The second transition focuses on progressing from achieving consensus within a team to effectively applying that consensus in broader, cross-group contexts. This aspect of the framework underscores the importance of adaptability and the practical application of collaborative outcomes [4, 5]. Furthermore, the interconnected nature of the five stages ensures that the output of each phase serves as the foundation for the subsequent phase, creating a cohesive and logical progression [6, 7]. This systematic structure not only simplifies the implementation of the method but also provides educators with a clear framework to identify and address potential challenges faced by students at each stage. By promoting both individual and

collective learning, the TaBLE framework offers a comprehensive approach to enhancing educational outcomes in case-based teaching environments (As shown in Table 2).

Table 1. The Five-Phase Structure of the TaBLE Method

Phase	Name	Timing	Core Task
Phase 1	Individual Preparation	Pre-class	Read the case; understand initial connections between theory and context
Phase 2	Individual Readiness Assurance	In-class (beginning)	Complete a test independently to demonstrate individual preparation
Phase 3	Team Readiness Assurance	In-class (middle)	Discuss in teams, reach consensus, and engage in peer teaching
Phase 4	Team Application and Cross-Group Discussion	In-class (later)	Apply theory to case problems and share findings across groups
Phase 5	Individual Reflection	Post-class	Write a reflective report to connect theory with practice

Table 2. TaBLE Five Phases of the Negotiation Case Activities

TaBLE Phase	Approximate Time	Corresponding Case Activity	Student Main Tasks
Phase 1: Individual Preparation (pre-class)	1–2 days before class	Pre-class reading and concept learning	Study PERT estimation, BATNA, interest-position distinction; preview case background
Phase 2: Individual Readiness Assurance (in-class, beginning)	10 minutes	Brief quiz or Q&A	Answer short questions to demonstrate mastery of formulas and negotiation concepts
Phase 3: Team Readiness Assurance (in-class, middle)	30 minutes	Intra-group discussion and analysis	Calculate expected duration, cost, and risk; reach consensus on negotiation goals and bottom line
Phase 4: Team Application & Cross-Group Discussion (in-class, later)	45 minutes (including 35 min negotiations + 10 min client decision)	Client and vendor negotiations	Clients negotiate with each vendor; vendors respond to offers; clients deliberate internally and select a partner
Phase 5: Individual Reflection (post-class)	2 days after class	Reflective report	Analyse own negotiation performance, use of AI tools, and application of project management knowledge

2.2. Case Design

This case study is built around a project bidding and negotiation simulation designed to enhance students' practical understanding of project management and negotiation strategies. In this simulation, two groups of students represent client firms, each tasked with outsourcing a distinct project. Four additional groups act as bidding vendors, competing to secure contracts from the clients. Each client is provided with specific parameters, including a maximum budget, a standard project duration, penalties for late delivery, bonuses for early completion, and an internal value parameter that remains

undisclosed to the vendors [1, 8]. The vendor teams, on the other hand, are equipped with varying daily labor costs and three time estimates—optimistic, most likely, and pessimistic—for each project. These inputs enable students to utilize the Program Evaluation and Review Technique (PERT) to calculate the expected project duration and its standard deviation. Subsequently, they estimate the total project cost, factoring in potential penalties or bonuses based on delivery timelines. Additionally, students are required to apply a structured negotiation framework, incorporating key concepts such as Best Alternative to a Negotiated Agreement (BATNA), reservation point, target point, and negotiation zone. These elements guide students in systematically preparing for the bidding process by defining their optimal alternatives, acceptable limits, desired outcomes, and the range within which agreements can be reached. This comprehensive approach ensures that students are well-equipped to navigate the complexities of negotiation and decision-making in a simulated business environment.

During the simulation, students assume the roles of either clients or vendors, engaging in a dynamic and iterative process that mirrors real-world project negotiations. Initially, each team conducts a detailed analysis of the provided data, calculating expected project durations, costs, and associated risks [9]. Based on these findings, they develop an initial negotiation strategy tailored to their objectives. The negotiation process unfolds over several rounds, during which clients and vendors strive to balance competing priorities such as time, cost, and risk. The ultimate aim is to achieve agreements that are mutually beneficial, reflecting a balance between the clients' budgetary constraints and project requirements and the vendors' need to secure favorable terms. At the conclusion of the simulation, each client selects one vendor to collaborate with, while vendors aim to maximize their profitability and secure advantageous contract terms. This structured activity not only fosters critical thinking and strategic planning but also provides students with hands-on experience in managing complex negotiations. Table 2 outlines the specific phases of the case design, integrating the TaBLE theory to provide a clear framework for the negotiation activities.

3. Findings

3.1. Analytical Use of Data

In traditional exercises, students typically apply the Program Evaluation and Review Technique (PERT) to fixed numerical values, which often simplifies the complexity of real-world scenarios. However, in this simulation, participants were required to address probabilistic outcomes, introducing a layer of uncertainty that demanded more nuanced analytical approaches. Several vendor groups engaged in detailed calculations to determine expected durations and standard deviations, which allowed them to design multiple proposals tailored to varying confidence levels [10]. For instance, one group discovered that opting for a shorter schedule significantly reduced the probability of on-time delivery. This realization compelled them to shift their perspective, treating project estimates as dynamic ranges rather than static point values. Such an approach not only enhanced their understanding of risk management but also underscored the importance of flexibility in project planning. By grappling with these probabilistic scenarios, students gained valuable insights into the trade-offs between schedule compression and delivery reliability, fostering a more comprehensive appreciation of project dynamics.

Client groups, on the other hand, demonstrated a marked progression beyond simplistic cost comparisons, showcasing a deeper engagement with multi-faceted decision-making frameworks. One client group, for example, developed a sophisticated net-benefit model that integrated multiple variables, including price, delay penalties, and early completion bonuses. This model enabled them to evaluate vendors not merely on cost or speed but on a broader spectrum of performance metrics [11, 12]. Interestingly, the vendor ultimately selected was neither the cheapest nor the fastest. Instead, the decision hinged on the vendor's ability to provide a clear and enforceable penalty mechanism, coupled with a delivery window that exhibited minimal variability. This approach

highlighted the critical role of predictability and accountability in vendor selection processes. By prioritizing these factors, the client group demonstrated an advanced understanding of how to balance financial considerations with operational reliability, thereby achieving a more strategic and informed decision-making process.

3.2. Negotiation and Communication

Several reports highlighted the importance of analyzing key negotiation elements such as BATNA (Best Alternative to a Negotiated Agreement), reservation points, and negotiation zones, particularly when operating under time constraints. For instance, one client demonstrated flexibility by agreeing to a longer project timeline after the vendor introduced a binding delay penalty clause, effectively trading time for enhanced contractual security. This decision underscores how strategic concessions can align with client priorities to achieve mutually beneficial outcomes. Another vendor group employed a sequential negotiation strategy, initially presenting a moderate proposal and subsequently adjusting their offer to prioritize speed after discerning that the client valued expedited delivery. This adaptive approach illustrates the significance of dynamic communication and responsiveness in negotiations. Conversely, unsuccessful bidders provided valuable insights into the consequences of misaligned strategies. One vendor acknowledged their failure to assess the client's preferences adequately, focusing on schedule stability without verifying its importance to the client. This oversight became evident when competitors proposed shorter delivery timelines with acceptable risk levels, leading the client to select a more cost-effective option. The vendor's post-negotiation reflection revealed a critical mismatch between their communication emphasis and the client's actual priorities, emphasizing the need for thorough preference analysis and tailored messaging in negotiation processes.

3.3. AI-related Reasoning

Several reports demonstrated reasoning patterns that align with human-AI collaborative processes, even when explicit documentation of AI usage was absent. For instance, one vendor described a structured iterative workflow involving multiple stages of refinement. Initially, a proposal was presented, followed by client feedback emphasizing the prioritization of speed over reliability. This feedback prompted adjustments to the timeline, which were subsequently reviewed and refined further based on additional client input, ultimately leading to a finalized plan. Such iterative cycles reflect the dynamic interplay often observed in human-AI collaboration, where computational tools assist in refining outputs based on evolving requirements. Another example highlighted the challenge of translating precise computational results into actionable insights [13]. While one group successfully calculated a specific probability, they encountered difficulties in contextualizing this data in terms that resonated with the client's economic priorities, such as quantifying potential savings from reduced penalties. This underscores the importance of bridging technical precision with practical applicability in decision-making processes.

3.4. Teamwork and Role Distribution

Some groups explicitly divided analytical work to ensure a more structured and efficient approach to problem-solving. For instance, one client team strategically allocated specific responsibilities among its members, assigning one individual to focus on cost logic, another on schedule logic, and a third on penalty logic [14]. This division of labor allowed the team to conduct detailed analyses in each area before synthesizing the findings into a comprehensive final decision. Similarly, a vendor group described a systematic workflow that included distinct phases: data reception, internal discussion, option design, negotiation, internal review, and the formulation of a final offer. Such structured processes often facilitated clarity and alignment within teams. However, teams that experienced failure frequently cited communication breakdowns and insufficient internal coordination as significant challenges. For example, one vendor noted that the client struggled to comprehend why their proposed price was substantially higher than

the basic cost, indicating a lack of effective communication regarding pricing rationale. Another vendor admitted to prioritizing stability excessively without adequately assessing whether this attribute was genuinely valued by the client. These examples underscore the critical importance of clear communication, thorough understanding of client priorities, and cohesive teamwork in achieving successful outcomes.

4. Discussion

4.1. Pre-class Knowledge Instruction

Students demonstrated the ability to apply PERT formulas accurately, showcasing their understanding of the mathematical procedures involved. However, their initial interpretation of the results as fixed values rather than probabilistic outcomes highlighted a critical gap in their comprehension. This gap became evident during simulation exercises, which required students to engage in negotiations and articulate the trade-offs between schedule duration and the probability of project completion. These activities compelled students to shift their focus from mere calculation to a deeper interpretation of the results, emphasizing the importance of probabilistic thinking in project management. Such a shift is challenging to achieve through pre-class instruction alone, as traditional preparatory methods often emphasize procedural knowledge over conceptual understanding. To address this limitation, pre-class activities could be enhanced by incorporating tasks that require students to justify their reasoning. For instance, students could be asked to write concise explanations of what a standard deviation signifies in the context of a client's penalty risk. This approach would encourage them to connect statistical concepts with real-world implications, fostering a more nuanced understanding of uncertainty and risk management in project planning.

4.2. Case Background and Data Distribution

Client groups developed their own net-benefit models and engaged in decision-making processes that required balancing factors such as price, penalty, and schedule certainty. This approach highlights the effectiveness of incorporating information asymmetry into the design, as it compelled students to actively engage with incomplete data sets rather than passively analyzing fully provided information. Initially, many participants approached the distributed data as if it were static and unchangeable, which limited their ability to explore alternative scenarios or question underlying assumptions. To address this, a structured intervention could be introduced to prompt deeper critical thinking. For instance, at the conclusion of this stage, teams could be required to identify and articulate three specific pieces of information they would need to obtain from the opposing party to refine their models or improve their decision-making accuracy [15]. This additional step would not only encourage students to recognize the dynamic nature of the data but also foster collaborative problem-solving and negotiation skills. By emphasizing the necessity of assumptions and interdependence in decision-making, the exercise could better simulate real-world complexities and enhance the learning experience.

4.3. Group Discussion with AI Assistance

Teams demonstrated significant variability in their approaches to resolving internal disagreements during collaborative tasks. Some groups adopted a systematic approach, explicitly comparing methods and reaching consensus efficiently. In contrast, other teams became entangled in discussions over minor numerical discrepancies, often neglecting to clarify the foundational assumptions underlying their calculations. This highlights the potential value of implementing a structured guide to facilitate internal alignment. For instance, teams could be required to articulate three shared assumptions before initiating calculations. These assumptions might include interpretations of critical variables, such as the most likely time for an event to occur or the application of specific penalty clauses. Such a framework could streamline decision-making processes and reduce unnecessary disputes. Additionally, iterative reasoning emerged as a common practice among several

teams, characterized by a cycle of proposal, feedback, and subsequent revision. This iterative process aligns closely with principles of effective human-AI collaboration, where continuous refinement enhances outcomes. However, a notable shortcoming was the inconsistent documentation of AI usage. To address this, a minimal documentation requirement could be introduced. For example, each team could be mandated to record at least one question posed to an AI tool and one adjustment made based on the AI's response [16]. This would ensure transparency and provide valuable insights into the integration of AI in collaborative settings.

4.4. Cross-group Negotiation and Decision

Successful students demonstrated a strategic approach by aligning their proposals with the specific concerns and priorities expressed by the other party during negotiations [17, 18]. This alignment was a key factor in achieving favorable outcomes, as it allowed these students to address the client's needs effectively. Conversely, students who were less successful often realized post-simulation that they had misunderstood or misinterpreted the client's priorities, which negatively impacted their results. This highlights the simulation's value as a learning tool, offering a dynamic environment where missteps lead to tangible consequences, unlike traditional lecture-based methods. Clients in the simulation evaluated proposals across multiple dimensions, frequently opting for vendors with higher costs but more robust risk management strategies. This decision-making pattern underscores the simulation's success in achieving its core objective: encouraging participants to balance considerations of time, cost, and risk effectively. A notable challenge identified in the reports was the pressure imposed by limited time, which occasionally resulted in negotiations concluding before all potential options could be thoroughly explored. To address this, a proposed modification involves introducing a brief second round of negotiations, restricted to two finalist vendors. This adjustment could maintain competitive dynamics while enabling a more in-depth exploration of proposals, ultimately enhancing the learning experience for participants.

4.5. Post-simulation Reflective Report

Students who experienced a loss during the simulation tended to produce more detailed and nuanced analyses of their errors compared to those who achieved success. Specifically, losing teams were more adept at pinpointing precise discrepancies between their initial assumptions and the actual priorities of the opposing party. This level of specificity often highlighted critical areas for improvement and demonstrated a deeper engagement with the reflective process [9]. In contrast, winning teams frequently focused on describing their achievements without adequately acknowledging the contextual or situational factors that contributed to their success. To ensure a more balanced and comprehensive reflective output across all participants, it may be beneficial to implement a standardized set of structured questions for all students, regardless of their outcomes. For instance, students could be prompted to identify one assumption they made about the opposing party that proved to be incomplete or inaccurate. Additionally, they could be asked to propose one specific adjustment they would implement in a similar negotiation scenario in the future. This approach would encourage all participants to engage in critical self-assessment and foster a more equitable learning experience. Overall, the five-stage design of the simulation offers a logical and progressive framework, transitioning from individual preparation to group alignment, external negotiation, and structured reflection. Each stage is designed to cultivate distinct competencies, and the observed patterns in student reflections provide valuable insights for introducing targeted scaffolding enhancements to further support learning outcomes.

5. Conclusion

This case design integrates project management knowledge, multi-party negotiation, and AI-assisted analysis into a coherent five-stage simulation that supports both conceptual understanding and applied performance. The overall results indicate that students strengthen technical competences, including PERT calculation, scheduling logic,

cost estimation, and the structured evaluation of project constraints, while simultaneously developing a broader set of professional capabilities. These capabilities include adaptive communication, audience diagnosis, strategic framing, collaborative problem solving, and metacognitive reflection on decision processes. A notable contribution of the design lies in its sequencing: individual preparation establishes analytical grounding, intra-group discussion promotes interpretation and prioritization, cross-group negotiation introduces uncertainty and competing interests, and structured reflection consolidates learning through explicit review of choices, trade-offs, and outcomes. Within this progression, AI can function as a useful support mechanism when its use is deliberately documented, critically interpreted, and compared against human judgment. Under time pressure, such support helps students refine proposals, test assumptions, identify weaknesses in argumentation, and explore alternative negotiation strategies without replacing independent reasoning. The design is therefore transferable across business and management education contexts, particularly in courses seeking to connect analytical tools with realistic interpersonal dynamics. For educators, the case offers a practical model for integrating quantitative analysis, negotiation practice, and reflective learning within a single instructional framework. Future implementations may further improve scaffolding for AI use, deepen reflective prompts, and refine assessment criteria; however, the central progression from preparation to negotiation to reflection remains an effective structure for holistic competence development.

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