

An Instructional Activity Based on Task-Based Learning and Feynman Learning to Enhance Autonomous Learning Ability and Verbal Ability in Military Theory Course for The First-Year Vocational College Students

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Abstract

This study sets four core research objectives: to design a combined instructional activity integrating Task-Based Learning (TBL) and Feynman Learning for vocational college military theory courses, to verify whether this activity improves freshmen's autonomous learning ability, to explore its effects on students' verbal ability, and to provide practical references for vocational education teaching reform. The research population included 328 first-year students from the School of Electromechanical Engineering of a vocational college, among whom 30 participants were selected via cluster random sampling. A 15-week pre-test and post-test quasi-experimental design was adopted. Two standardized assessment scales were used to collect data on students' autonomous learning ability and verbal ability, and descriptive statistics as well as paired-samples t-tests were applied for data analysis. The results revealed that after the intervention, students achieved statistically significant improvements in both abilities. Specifically, the mean score of autonomous learning ability rose from 60.33 to 71.13 ($p < 0.05$, Cohen's $d = 0.96$), and the mean score of verbal ability increased from 67.50 to 76.03 ($p < 0.05$, Cohen's $d = 1.73$). TBL effectively boosted students' learning initiative and independent problem-solving competence, while Feynman Learning deepened their comprehension of abstract theoretical concepts and optimized oral expression. This integrated teaching mode is proven feasible and effective for military theory teaching in vocational colleges, and it can serve as a practical approach to promote the high-quality development of vocational education.

Keywords: task-based learning; Feynman learning; autonomous learning ability; verbal ability

Introduction

In contemporary vocational education, cultivating students' autonomous learning ability and verbal expression competence has become a key goal linking academic development and career competency. Vocational college students are required to master professional knowledge, adapt to dynamic workplace demands, independently acquire new knowledge, and deliver clear expression in study and work scenarios. For newly enrolled vocational freshmen, the transition from secondary education to higher vocational education puts forward higher requirements for self-management, classroom participation, independent learning and oral communication. Nevertheless, a large number of first-year students lack learning initiative and possess weak expressive skills, which hinders their mastery of theoretical knowledge and practical application capabilities (Lyu & Singh, 2025; Song et al., 2021).

Military theory course is a compulsory basic course for vocational college students, undertaking the missions of cultivating national defense awareness, civic responsibility, political literacy and comprehensive quality. This course contains abstract concepts, systematic theoretical frameworks and complicated historical and strategic content, which demands students to conduct pre-class preparation independently, interpret core concepts, sort out information and express viewpoints logically. Traditional teacher-centered cramming teaching leads students to passively receive knowledge, making it hard for them to internalize theories, participate in classroom interaction, and develop the verbal competence for explaining and discussing military theories.

Task-Based Learning (TBL) and Feynman Learning are two advanced learning theories that can address the above problems. TBL is a learner-oriented teaching method taking meaningful task completion as the core of learning. Students construct knowledge and develop comprehensive skills through task analysis, information collection, group collaboration, result presentation and reflection (Lyu & Singh, 2025; Mulyadi et al., 2021, 2023; Pham & Do, 2021). It fits the practical orientation of vocational education well. Feynman Learning, derived from Richard Feynman's learning philosophy, advocates explaining complex knowledge in plain language to others, so as to identify knowledge loopholes, supplement difficult content and polish expression (Feynman et al., 1997). This method facilitates in-depth knowledge understanding and verbal ability improvement through repeated explanation and peer interaction.

Existing studies have confirmed that TBL promotes active and autonomous learning, and Feynman Learning enhances knowledge mastery and oral expression. However, few scholars have

combined the two methods and applied the integrated mode to military theory courses for vocational college freshmen (Musengimana et al., 2022; Wea et al., 2023). On this basis, this study designs an instructional activity combining TBL and Feynman Learning, and explores its impacts on students' autonomous learning ability and verbal ability.

Research objectives

The four specific research objectives are as follows: first, develop a set of TBL and Feynman Learning integrated teaching activities for military theory courses; second, examine whether the activities can improve first-year vocational college students' autonomous learning ability; third, verify the effectiveness of the activities in enhancing students' verbal ability; fourth, provide empirical evidence and practical strategies for vocational college teaching reform.

Literature Review

Theoretical Foundations

1. Task-Based Learning Theory

Task-Based Learning (TBL) originated from communicative language teaching theories and has gradually evolved into a widely applied teaching paradigm across disciplines. Its core connotation is to take meaningful learning tasks as the carrier of teaching activities, shifting the teaching focus from unilateral knowledge transmission to students' active task participation (Ellis, 2003). Willis (1996) divided TBL teaching procedures into pre-task, task cycle and language focus stages, emphasizing that students should complete real or simulated tasks through cooperation, so as to realize knowledge construction in the process of solving practical problems.

From the perspective of learning psychology, TBL sets clear learning goals for students, stimulates internal learning motivation, and drives learners to actively collect materials, analyze problems and summarize experience (Mulyadi et al., 2023). In the field of vocational education, which highlights practicality, TBL perfectly matches the talent training orientation. It bridges theoretical knowledge and professional scenarios, and trains students' practical operation and problem-solving ability while completing learning tasks (Mulyadi et al, 2023; Pham & Do, 2021). Lyu and Singh (2025) pointed out that task-driven teaching can effectively improve students' classroom engagement and sense of learning responsibility, and lay a foundation for the cultivation of long-term autonomous learning habits.

2. Feynman Learning Theory

Feynman Learning, also known as the Feynman Technique, was summarized based on the learning experience of physicist Richard P. Feynman. The core theoretical logic is: real understanding of knowledge can only be achieved when one can explain professional and complex content to people without relevant background in simple language (Feynman et al., 1997). The standard implementation steps of this theory include four parts: learning new knowledge, explaining knowledge to others, discovering unclear knowledge points, and returning to materials for re-learning and re-explanation (Reyes et al., 2021).

This learning theory is closely combined with deep learning and metacognition theories. In the process of explaining knowledge, learners constantly examine their own knowledge system, correct cognitive deviations and reorganize knowledge frameworks (Reyes et al., 2021). A large number of educational studies have proven the value of Feynman Learning in subject teaching. Wea et al. (2023) applied this method to biology teaching and found that it helped students sort out confusing concepts and strengthen logical expression. Wea et al. (2023) implemented Feynman Learning in physics classrooms, and the results showed that students' conceptual understanding and explanatory ability were significantly improved. Besides, this learning method breaks the limitation of rote memorization and is especially suitable for courses with numerous abstract theories (Adeoye, 2023).

3. Autonomous Learning Theory

Autonomous learning, also called self-regulated learning, refers to learners' ability to independently formulate learning plans, monitor learning processes, adjust learning strategies and evaluate learning effects (Zimmerman, 2002). Its main dimensions cover self-regulation, metacognition, self-motivation and independent problem-solving ability. For vocational college students, autonomous learning ability is an essential core literacy. With the continuous update of industrial technologies and professional knowledge, students with strong autonomous learning ability can adapt to career changes better, actively acquire new skills and solve practical difficulties in study and work (Mulyadi et al., 2023).

Related studies have shown that reasonable task design can provide external support for autonomous learning. Clear task objectives and rich task scenarios can guide students to take the initiative to allocate learning time, select learning resources and cooperate with peers, so as to continuously improve self-management and independent exploration capabilities (Musengimana et al., 2022; Deng et al., 2022).

4. Verbal Ability Theory

Verbal ability is a comprehensive linguistic and thinking competence, including vocabulary mastery, text comprehension, syntactic application, verbal reasoning and interpersonal communication competence (Mulyadi et al., 2021; Pham et al., 2022). In theoretical courses such as military theory, verbal ability is not limited to simple oral expression; it further requires students to interpret abstract concepts, sort out logical viewpoints, participate in academic discussions and accurately convey personal understanding (Rahimi, 2022; Song et al., 2021).

Expression-oriented learning activities are important paths to cultivate verbal ability. When learners need to convert abstract theoretical knowledge into oral language for output, they will actively sort out logical relationships, optimize language organization and improve the accuracy and fluency of expression (Song et al., 2021). Feynman Learning, which takes peer explanation as the core link, has a natural coupling relationship with the cultivation of verbal ability.

Current Research Status of Combined Application of Two Teaching Methods

At present, domestic and foreign academic circles have conducted abundant separate researches on TBL and Feynman Learning. TBL has been widely used in language teaching, science teaching and vocational skill training, and its positive effects on activating classroom atmosphere and cultivating practical abilities have been fully verified (Mulyadi et al., 2023; Lyu & Singh, 2025). Feynman Learning is mostly applied in science, mathematics and biology courses, and scholars have confirmed its advantages in breaking difficult knowledge points and training expression ability (Wea et al., 2023).

Nevertheless, there are obvious research gaps in existing studies. First, most studies discuss TBL and Feynman Learning independently, while researches on integrating the two methods into a complete teaching activity are scarce. Second, the application scenarios of the two methods are concentrated in basic disciplines such as language and natural science, and there is almost no empirical research targeting vocational college military theory courses. Third, most relevant researches take academic performance as the main evaluation index, while few studies take autonomous learning ability and verbal ability as dual core outcome variables for joint investigation. Fourth, empirical researches adopting pre-test and post-test quasi-experimental design for vocational college freshmen are insufficient, lacking reliable data support for teaching reform.

Literature Review Conclusion

To sum up, TBL, Feynman Learning, autonomous learning and verbal ability have formed relatively complete theoretical systems, and separate applications of TBL and Feynman Learning have obtained positive research results in multiple disciplines. In view of the current situation that vocational college military theory courses are dominated by indoctrination teaching, and students generally have insufficient autonomous learning awareness and weak verbal expression ability, integrating TBL and Feynman Learning is theoretically feasible. TBL can build task-based learning scenarios to drive students' autonomous exploration, while Feynman Learning can take explanation as the carrier to deepen knowledge understanding and polish verbal expression. Making up for the existing research gaps, this study constructs an integrated teaching mode of TBL and Feynman Learning, and empirically tests its actual effects on vocational college freshmen's autonomous learning ability and verbal ability, which has important theoretical significance and practical value for enriching teaching theories of military theory courses and promoting vocational education reform.

Research Framework

This research is based on the core assumption that the integrated teaching activity of TBL and Feynman Learning can effectively improve students' autonomous learning ability and verbal ability through the whole process of task completion, independent exploration, peer explanation and reflective revision. Among them, TBL provides overall task framework and real learning scenarios for classroom teaching; Feynman Learning sets explanation and reflection links to deepen knowledge understanding and strengthen oral expression. The integrated teaching activity is taken as the intervention variable, autonomous learning ability and verbal ability as outcome variables. The complete learning process includes task analysis, independent learning, collaborative problem-solving, peer explanation, feedback and revision.

Table 1 Conceptual Framework of the TBL–Feynman Integrated Instructional Activity

Instructional Component	Learning Process Mechanism	Outcome Variable	Expected Effect
Task–Based Learning	Meaningful task assignment, task analysis, group cooperation, task presentation and learning reflection	Autonomous learning ability	Improve self–regulation, metacognition, self–motivation and independent problem–solving ability
Feynman Learning	Concept simplification, peer explanation, knowledge gap identification, content review and repeated explanation	Verbal ability	Improve vocabulary application, text comprehension, verbal reasoning, communicative competence and expression clarity
Integrated instructional activity	Complete tasks → Explain knowledge → Receive feedback → Revise content → Re–present results	Overall course learning effect	Deepen the understanding of military theory knowledge and enhance students' classroom participation

Research Methodology

Research Design

This study employed a pre–test and post–test quasi–experimental research design to systematically investigate the impact of an integrated teaching approach on students' learning outcomes. Specifically, a 15–week integrated teaching intervention—combining Team–Based Learning (TBL) with the Feynman Technique—was implemented within the context of a compulsory military theory course offered at a vocational college. The primary objective of this design was to assess the effectiveness of the TBL–Feynman integrated teaching activity by measuring and comparing participants' levels of autonomous learning ability and verbal communication skills before and after the intervention period. By utilizing this quasi–experimental framework, which lacks random assignment to treatment and control groups but maintains temporal sequence and measurement consistency, the study aimed to capture meaningful changes attributable to the instructional strategy. This design is particularly well–suited for educational settings where randomization is impractical, yet it still allows for robust observation of learners' developmental trajectories in key competencies over an extended instructional period. Moreover, the longitudinal nature of the 15–week intervention enables a more nuanced

understanding of how sustained exposure to the integrated pedagogy influences the gradual enhancement of students' comprehensive academic and cognitive abilities.

Sample Selection and Sample Size

The target population for this study comprised 328 first-year undergraduate students enrolled in the School of Electromechanical Engineering (during the 2024 academic year at a vocational college in China. Given the constraints of classroom-based educational research and the need to maintain ecological validity, the study adopted a cluster random sampling method to select a representative subset of participants. Specifically, one intact class was randomly chosen from the available cohort, resulting in a final research sample of 30 students—equally balanced by gender, with 15 male and 15 female participants—all of whom were approximately 18 years of age at the time of data collection. This balanced composition was intentionally maintained to minimize potential gender-related confounding effects and to support equitable analysis across demographic variables. Critically, all selected participants completed both the pre-test administered prior to the intervention and the post-test conducted upon its conclusion, thereby ensuring the completeness, internal consistency, and longitudinal integrity of the collected data.

The determination of the final sample size was guided not only by statistical considerations but also by practical factors inherent to the institutional context, including the standard class size for military theory courses, scheduling limitations, and the logistical feasibility of implementing a 15-week teaching intervention without disrupting the regular academic curriculum. Consequently, the chosen sample size reflects a careful balance between methodological rigor and real-world instructional constraints, allowing for meaningful insights while maintaining operational viability within the existing educational framework.

Research Instruments

Three research tools were used in this study, with good reliability verified:

1. Autonomous Learning Ability Assessment Scale: It contains four dimensions (self-regulation, metacognition, self-motivation, independent problem-solving), 20 items in total, adopting 5-point Likert scoring, with a full score of 100. The Cronbach's α of pre-test was 0.85, and post-test was 0.80, indicating good internal reliability.

2. Verbal Ability Assessment Scale: It covers five dimensions (vocabulary knowledge, comprehension, syntax and grammar, verbal reasoning, communicative competence), 20 items in

total, adopting 5-point Likert scoring, with a full score of 100. The Cronbach's α of pre-test was 0.747, and post-test was 0.772, with acceptable reliability.

3. Integrated Teaching Activity Plan: Combined with the syllabus of military theory course, 15 teaching sessions were designed, covering national defense overview, military thought, strategic situation and other core contents.

Design and Implementation of Instructional Activities

The whole teaching cycle lasted 15 weeks, integrating TBL and Feynman Learning into every teaching session:

1. TBL part: Design practical learning tasks such as military case analysis, group debate and problem-oriented discussion. Students needed to collect information, analyze problems, form viewpoints and present task results independently or cooperatively.

2. Feynman Learning part: After completing group tasks, students were required to interpret core military theory concepts to peers in simple language. In the explanation process, students found out ambiguous knowledge points, re-learned teaching materials, optimized expression logic, and realized knowledge consolidation through peer communication.

Data Collection

Before the 15-week teaching intervention, the two assessment scales were distributed to all sample students for pre-test to record their initial level of autonomous learning ability and verbal ability. After the intervention, the same scales were used for post-test. All data were collected uniformly and sorted out for subsequent statistical analysis.

Data Analysis Methods

SPSS statistical software was used for data processing, including two analytical methods:

1. Descriptive statistics: Calculate the maximum value, minimum value, mean value (M) and standard deviation (SD) of pre-test and post-test scores to describe the overall distribution of data.

2. Paired-samples t-test: Test whether the difference between pre-test and post-test scores was statistically significant, with the significance level set at $p < 0.05$. Meanwhile, Cohen's d was calculated to evaluate the effect size of the teaching intervention.

Research Results

1. Descriptive Statistical Results of Two Abilities

As shown in Table 2, after the 15-week TBL–Feynman integrated teaching intervention, students' autonomous learning ability and verbal ability both achieved obvious improvements in mean scores.

Table 2 Descriptive Statistics of Pre-test and Post-test Variables (N=30)

Variable	Test Type	N	Max	Min	M	SD
Autonomous Learning Ability	Pre-test	30	83	33	60.33	11.96
	Post-test	30	90	46	71.13	10.38
Verbal Ability	Pre-test	30	88	48	67.50	7.42
	Post-test	30	91	65	76.03	8.39

2. Paired-Samples T-test Results

It can be seen from Table 3 that there were significant differences between pre-test and post-test scores of the two abilities ($p = 0.000 < 0.05$). For autonomous learning ability, $t = 3.73$, $df = 29$, Cohen's $d = 0.96$ (large effect size); for verbal ability, $t = 6.72$, $df = 29$, Cohen's $d = 1.73$ (extremely large effect size). The results fully prove that the integrated teaching activity has a significant promoting effect on the two abilities.

Table 3 Paired-Samples T-Test Results

Variable	Test Type	N	M	SD	t	df	p	Cohen's d
Autonomous Learning Ability	Pre-test	30	60.33	11.96	3.73	29	0.000*	0.96
	Post-test	30	71.13	10.38				
Verbal Ability	Pre-test	30	67.50	7.42	6.72	29	0.000*	1.73
	Post-test	30	76.03	8.39				

Note: $p < 0.05$

3. Result Summary Corresponding to Research Objectives

Table 4 summarizes the research results combined with the four preset research objectives: the TBL–Feynman integrated teaching activity was successfully designed and implemented in military theory courses; the activity significantly improved students' autonomous learning ability and verbal ability; reliable empirical evidence was provided for vocational college teaching reform.

Table 4 Research Results According to Research Objectives

Research Objective	Main Evidence	Result	Interpretation
Design TBL and Feynman Learning integrated instructional activities	15-week complete teaching plan including task completion and peer explanation links	The integrated activity was stably implemented in military theory courses	TBL builds task framework; Feynman Learning adds explanation and reflection mechanism
Improve students' autonomous learning ability	Pre-test $M=60.33$, Post-test $M=71.13$, Cohen's $d=0.96$	Significant improvement	Task-driven activities enhance self-regulation and independent problem-solving ability
Improve students' verbal ability	Pre-test $M=67.50$, Post-test $M=76.03$, Cohen's $d=1.73$	Significant improvement	Peer explanation optimizes knowledge organization and oral expression
Provide evidence for vocational education teaching reform	Complete quasi-experimental data and significant intervention effect	The mode has practical promotion value	It can be applied to theoretical public courses in vocational colleges

Discussions

The empirical results verify that the TBL–Feynman integrated teaching activity can effectively improve vocational college freshmen's autonomous learning ability and verbal ability in military theory courses, which is consistent with the preset research framework. The whole learning cycle of task participation, independent exploration, peer explanation, feedback and revision jointly promotes students' comprehensive development.

In terms of autonomous learning ability improvement, TBL changes the traditional passive knowledge-receiving mode of military theory teaching. When students complete military case analysis, group debate and problem discussion tasks, they need to clarify learning goals, collect

information, sort out materials and monitor learning progress independently. This series of behaviors act on all dimensions of autonomous learning (self-regulation, metacognition, self-motivation, independent problem-solving). This conclusion is consistent with the research of Ellis (2003), Musengimana et al. (2022), and Mulyadi et al. (2023), which further proves that task-based teaching can activate students' internal learning motivation and cultivate long-term autonomous learning habits.

In terms of verbal ability improvement, Feynman Learning plays a core role. Military theory contains a large number of abstract concepts and systematic theoretical contents. Simple teacher lecturing can only let students stay in superficial memory. The requirement of explaining knowledge in plain language forces students to reorganize knowledge systems, find out cognitive blind spots, re-learn difficult contents and polish expression logic. Therefore, students' vocabulary application, logical reasoning and communicative competence are comprehensively improved. This result supports the research viewpoints of Feynman (1985), and Wea et al. (2023), and reflects the unique advantages of explanation-oriented learning in cultivating verbal ability.

More importantly, TBL and Feynman Learning do not work independently. TBL provides learning content, scenarios and goals, while Feynman Learning transforms task results into standardized oral expression and in-depth knowledge reflection. The integration of the two methods forms a closed-loop learning mechanism. Autonomous learning ability supports students to complete tasks and understand theories, and verbal explanation in turn consolidates learning effects and enhances learning confidence. The simultaneous improvement of the two abilities is the joint effect of the integrated teaching mode, rather than the single role of one teaching method.

New Knowledge from Research

The core new achievement of this study is constructing and empirically verifying a TBL-Feynman integrated teaching model applicable to vocational college military theory courses. This model realizes the simultaneous cultivation of autonomous learning ability and verbal ability through task-driven participation plus explanation-based reflection, and is suitable for all courses featuring abstract theoretical content and clear expression requirements. The detailed composition of the model is shown in Table 5.

Table 5 New Knowledge Model Generated from the Research

Model Element	Main Activity	Knowledge Contribution
Task Scenario	Military case analysis, group debate, strategic issue discussion	Set clear learning goals and build practical learning scenarios
Independent Exploration	Information retrieval, concept sorting, problem analysis, task preparation	Cultivate self-regulation, metacognition, learning motivation and problem-solving awareness
Feynman Explanation	Simplify professional concepts, explain to peers, find knowledge gaps	Deepen knowledge understanding and strengthen verbal expression ability
Feedback and Revision	Peer feedback, teacher guidance, repeated explanation, task result optimization	Promote learning reflection, error correction and sustainable learning ability
Final Learning Outcomes	Improved autonomous learning ability and verbal ability	Improve the teaching quality of military theory courses and support vocational education reform

This model breaks the single knowledge-transmission positioning of traditional theoretical courses. It guides teachers to design exploratory, expressive and reflective learning tasks, so that students can develop independent learning ability and logical expression ability while mastering theoretical knowledge.

Conclusion

This study designed and implemented a 15-week instructional activity integrating Task-Based Learning and Feynman Learning, taking 30 first-year students from the School of Electromechanical Engineering of a vocational college as samples to carry out quasi-experimental research. After the teaching intervention, students' autonomous learning ability and verbal ability both obtained statistically significant improvements, with large and extremely large effect sizes respectively. The research confirms that TBL can activate students' learning participation and autonomous learning awareness, and Feynman Learning can deepen theoretical understanding and optimize oral expression. The integrated teaching mode solves the drawbacks of indoctrination teaching in vocational college military theory courses, and provides an effective and operable teaching strategy for improving teaching quality of theoretical courses and promoting vocational education reform.

Suggestions

Suggestions for Practical Application

1. Vocational colleges are strongly encouraged to widely implement and promote the integrated teaching approach that combines Team-Based Learning (TBL) with the Feynman Technique, particularly within military theory courses as well as other public theoretical courses that often face challenges in student engagement and deep comprehension. To effectively apply this model, instructors should thoughtfully design learning tasks that are closely aligned with specific course objectives—such tasks may include in-depth case analyses, focused topic discussions, and structured group debates. These activities not only foster collaborative learning but also create authentic contexts for knowledge application. Crucially, teachers must incorporate peer explanation sessions and systematic feedback mechanisms following task completion. By doing so, students are guided to move beyond superficial task fulfillment toward a deeper, more nuanced understanding of core theoretical concepts. This process encourages learners to articulate their reasoning clearly, identify gaps in their understanding, and refine their mental models through iterative dialogue.

2. Moreover, educators can adopt the Feynman Learning method as a regular and intentional classroom strategy aimed specifically at cultivating students' verbal communication skills alongside conceptual mastery. After students complete assigned learning activities, instructors should facilitate structured peer-teaching opportunities where learners explain key ideas to one another using plain language. During these sessions, peers provide constructive feedback that helps highlight areas of confusion or imprecise understanding. Students then revise and re-articulate their explanations based on this input, engaging in a cycle of refinement that simultaneously strengthens both their grasp of theoretical content and their ability to express complex ideas clearly and confidently. Over time, this repeated practice nurtures metacognitive awareness and enhances oral expression competence—two essential competencies for success in both academic and professional settings.

Suggestions for Future Research

1. Future studies should significantly expand the research sample size to enhance the generalizability and robustness of findings. Specifically, researchers are advised to recruit participants from a diverse range of academic disciplines, different grade levels (e.g., first-year to final-year students), and multiple vocational colleges across varied geographic and institutional

contexts. Such diversification will allow for a more comprehensive evaluation of the integrated TBL–Feynman teaching model’s universality, adaptability, and effectiveness across heterogeneous student populations and educational environments.

2. In addition, longitudinal follow-up research is highly recommended to investigate the sustainability of the learning gains observed in short-term implementations. Key questions to address include whether the improvements in students’ autonomous learning capabilities and verbal communication proficiency persist over extended periods after the intervention ends. This would provide critical insights into the long-term educational impact of the model. Furthermore, future research should actively explore the integration of digital tools and online learning platforms—such as learning management systems, interactive discussion forums, AI-assisted feedback tools, or video annotation software—with the TBL–Feynman framework. By examining how blended learning environments that combine face-to-face instruction with digital enhancements influence student outcomes, researchers can assess the potential of technology to amplify the benefits of this pedagogical approach and offer practical guidance for its scalable implementation in modern, tech-enabled classrooms.

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