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A Study on the Application of Sandboxing in Blended Learning——An Example of Cost Accounting

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Abstract: Traditional cost accounting instruction predominantly relies on theoretical lectures, often resulting in suboptimal learning outcomes due to the limited practical opportunities for students. The sand table simulation offers a solution by immersing students in virtual enterprise scenarios, where they assume cost management roles. This method has demonstrated superior teaching efficacy and enriched the pedagogical process. Nevertheless, the integration of sand table simulation in instruction presents challenges related to the adaptability of teaching aids, the moderation of teacher guidance, and time management. Drawing from the experience of implementing sand table simulations in a blended course reform, this paper presents innovative approaches to cost accounting education.

1 Introduction

1.1 Background to the study

The ongoing advancement of educational technology and the evolution of pedagogical concepts have led to the emergence of the blended teaching model. This model effectively integrates online resources with traditional classroom instruction, aiming to capitalize on the strengths of both mediums. In doing so, it offers students a more enriched, flexible, and efficient learning experience. The sand table projection, as an innovative and practical teaching tool, presents new avenues for reforming the Cost Accounting course. By simulating an enterprise operation scenario, students are able to assume various roles, thereby experiencing the flow and management of costs from raw material procurement and production to product sales. This hands-on approach allows students to gain a deeper comprehension of the real-world application of cost accounting in business operations,

enhancing their practical skills, teamwork, and problem-solving abilities.

Sand table deduction is an innovative teaching method that enables students to play multiple roles and actively engage in simulated enterprise operations. This approach aims to create an immersive learning experience, particularly in cost accounting courses, making abstract concepts tangible and allowing students to clearly understand the cost flow and management dynamics. Historically, with the evolution of educational concepts, sand table deduction has transitioned from a basic business simulation to a more refined, specialized, and diverse methodology. Its integration with both online and offline hybrid teaching methods not only enhances students' comprehension and application of professional knowledge but also fosters their teamwork, decision-making, and resilience. This method has emerged as a significant tool in curriculum reform, nurturing multifaceted talents equipped to meet the demands of the contemporary era. It continues to elevate educational standards and push the frontiers of innovation.

1.2 Analysis of the current status of domestic and international research

1.2.1 Current status of blended learning research

In 2017, China's Ministry of Education promulgated the 'Guidance on the Construction and Application of the Digital Educational Resources Public Service System.' This guidance introduced novel stipulations and expectations for educational endeavors in China, advocating for a unified public service system for educational resources that ensures 'one system for the entire nation, a singular resource system, individualized learning space for each student, and applications tailored for instruction.' The concept of blended teaching traces its roots back to 2000, as delineated in an American education white paper. A comprehensive review of research on blended teaching in China from 2020 to 2023 was conducted via the Knowledge Network channel, yielding over 19,000 pertinent journal articles. In the age of Internet information technology, there is a proliferation of vibrant online resources, diverse live platforms, and advanced online teaching software. Currently, the majority of universities and colleges in China have incorporated the blended teaching approach in their instructional methodologies.

1.2.2 Current status of research on sand table model derivation

In the mid-1940s, Professor Yi Tingyuan integrated the 'capital cycle theory' of Babi from Germany with the dual profit and loss calculations from the balance sheet and profit and loss account of Tetsuzo Ota from Japan. Utilizing the metaphor of a sink, he illustrated the principle of debit-credit double-entry bookkeeping, thus establishing the 'New Dynamic Theory'. Subsequently, in the early 1950s, the 'Movement of Funds Theory' was formulated under the influence of Marx's dialectical materialism and the labour value theory. The establishment of accounting accounts was elucidated using a pedagogical model. Building on the premise that 'the object of accounting is the movement of the enterprise's property value', faculty from the School of Accounting at Zhongnan University of Economics and Law developed the 'Accounting Plane Model' to simulate the motion of an enterprise's property value throughout its operations. This simulation formed the basis of the 'Capital Movement Theory'. Utilizing this model, they examined the accounting concept through the lens of property value movement. They proposed, for the first time, the incorporation of the sand table model into management's ERP experiment in accounting education. This was done via the utilization of sand piles and sand pits to simulate the capital movements produced by the economic activities of an enterprise in a comprehensive and panoramic view, thereby furthering the development and refinement of the 'capital movement theory'. Additionally, some accounting scholars have employed the use of chart accounting in their teaching, which represents accounting

content through graphs and tables. This method has proven beneficial in aiding student retention.

2 Current status of teaching cost accounting courses

2.1 Single mode of teaching

Traditional pedagogy of cost accounting courses predominantly relies on the lecture-based instruction of the teacher, using the textbook as the primary resource. The method involves systematic explanation of theoretical concepts such as various cost accounting techniques and fundamental principles of cost analysis. However, this singular mode of instruction often lacks dynamism and engagement, leading to a predominantly passive reception of knowledge among students. Consequently, it becomes challenging to encourage active learning enthusiasm and foster a spirit of inquiry.

2.2 Disconnect between theory and practice

In the educational process, there is a noticeable lack of effective integration between theoretical and practical teaching methodologies. The majority of instructional hours are dedicated to theoretical education, thereby leaving little room for substantial practical application. Consequently, despite gaining extensive theoretical knowledge in cost accounting, students often lack the opportunity to apply these principles to real-world business scenarios. Furthermore, the content of practical instruction is often overly simplified and idealized, leaving a significant void between academic learning and the complex cost management environments encountered within actual businesses. For instance, most cost accounting experimental courses offered by educational institutions merely provide students with the opportunity to solve simplified cost accounting cases featuring fixed data and a singular business process. This approach does not adequately prepare students to navigate the changing and uncertain aspects inherent in real-world cost accounting.

2.3 Poor student engagement

In traditional 'chalk-and-talk' pedagogy, the instructor merely elucidates the components and calculation principles of a formula in a unidirectional manner. This classroom dynamic exhibits a pronounced teacher-centric orientation, where the instructor regulates the pace and sequence of instruction. Consider the Approximate Production Proportion Method as an illustration. When determining the approximate production of an ongoing product, various estimation methods for the degree of completion can yield distinct computational approaches, each with its unique distribution formula. Notably, the Approximate Production Proportion Method shares similarities with the Fixed Proportion Method, especially in application contexts and computational logic. Students often struggle to distinguish between these methods during their studies. Furthermore, cost accounting encompasses over 200 formulas that are analogous in structure and computational procedure, posing significant challenges for students in terms of memorization and comprehension.

3 Analysis of the application of sandboxing in blended learning

Sandboxing plays a pivotal role in enhancing blended teaching methodologies. It transcends conventional educational constraints and establishes an experiential learning platform, particularly for cost accounting and related courses. Through the simulation of enterprise operations, sandboxing deepens students' comprehension of knowledge, bolsters practical skills, encourages innovative thought, and cultivates teamwork and professionalism. Consequently, it elevates the

overall quality of instruction and aids in the comprehensive development and future workplace readiness of students.

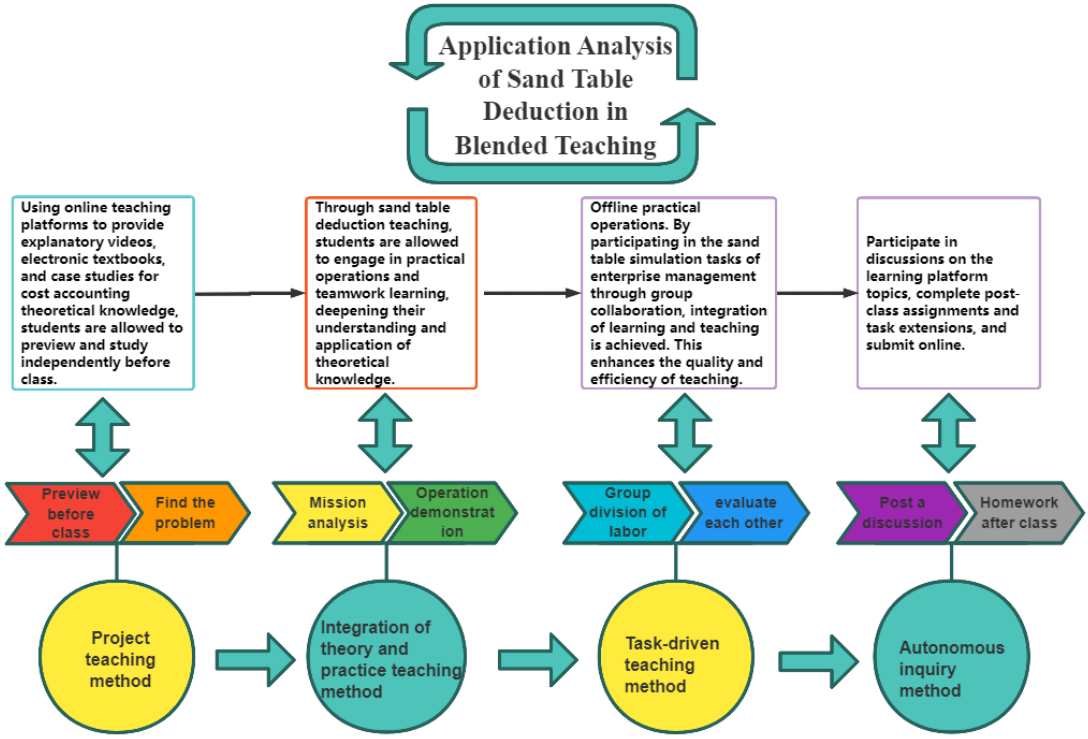

Figure 1 Structure of blended teaching and learning in sandboxing

3.1 Enhancing the effectiveness of teaching and learning

3.1.1 Deepening knowledge and understanding

In traditional cost accounting pedagogy, students frequently grapple with abstract concepts and intricate formulas. Through the utilization of a sand table exercise, learners are immersed in a simulated business environment where they can intuitively grasp the generation and flow of costs in purchasing, production, and sales. For instance, during the procurement of raw materials, students determine the purchasing quantity in alignment with the production plan, taking into account factors such as transportation costs and volume discounts. This approach facilitates a comprehensive understanding of material cost composition and accounting. In the production phase, principles like equipment depreciation and labour hour allocation become transparent. Such experiential learning fosters knowledge comprehension and retention, seamlessly bridging theory with practice, eschewing rote memorization, and bolstering the internalization of knowledge.

3.1.2 Strengthening operational capacity

Compared to traditional laboratory practice teaching, sand table deduction practice scenarios offer greater diversity and complexity. They transcend the constraints of basic case data processing by comprehensively encompassing the entirety of enterprise operations, necessitating the collaboration of multiple departments and diverse business functions. During this simulation, students are assigned distinct roles with corresponding cost management responsibilities. In response to changing business conditions and market dynamics, they engage in meticulous cost data collection, organization, calculation, and analysis to formulate sound cost control strategies. Such

experiences better equip students to address a wide range of practical challenges, thereby enhancing their adaptability and prowess in tackling complex problems.

3.2 Optimising the teaching and learning process

3.2.1 Increased interactivity in teaching and learning

Traditional cost accounting instruction is typically lecture-based, with students serving as passive recipients of knowledge and minimal teacher-student interaction. The sand table deduction teaching method has transformed this dynamic. In this approach, the teacher shifts from being a mere dispenser of knowledge to becoming a facilitator for student learning. As students navigate challenges, they proactively seek the teacher's guidance and engage in rigorous discussions with peers. For instance, when addressing a company's cost control issues, students might brainstorm solutions such as optimizing production processes, minimizing raw material waste, or adjusting staffing to enhance productivity. This interactive technique actively engages students, positioning them as central participants in the learning process rather than passive observers.

3.2.2 Increased timeliness of instructional feedback

In the sandbox exercise, each decision made by students directly influences the cost of the simulated business, allowing them to assess the efficacy of their choices and make necessary adjustments for optimization. For instance, if students overlook transport and inventory costs in raw material purchases, leading to increased expenses, they can subsequently revise their procurement strategies to minimize costs in future operations. Concurrently, the teacher evaluates the students' cost accuracy, control, and teamwork, highlighting any issues and offering constructive feedback. This immediate feedback loop facilitates students' rapid identification of problems, enabling them to adjust their learning approaches and enhance their overall learning effectiveness.

3.3 Shaping the overall quality of students

3.3.1 Creative thinking stimulation

Compared to traditional closed teaching methodologies, sand table deduction promotes the disruption of conventional thought processes in students, encouraging them to boldly explore novel methods and ideas. This establishes an open, challenging learning atmosphere for the students. During such exercises, they will confront a myriad of new problems and scenarios, requiring them to creatively apply their learned knowledge for problem-solving purposes. In simulating business operations, there is no single correct answer; rather, students are encouraged to make decisions based on personal understanding and judgement, provided they align with the business's objectives. This flexible, liberal learning environment fosters the development of independent thinking skills and an innovative spirit in students.

3.3.2 Professionalism development

The sand table exercise enables students to gain an early comprehension of the operational scenarios and requirements associated with cost accounting positions within businesses, thereby fostering their professionalism in a more effective manner. During this simulation process, students are required to adhere to the operational guidelines and ethical standards of the business, including principles such as honesty and trustworthiness in conducting cost accounting tasks, and strict

adherence to the confidentiality of the business's proprietary information. Concurrently, the simulation necessitates that students complete a variety of business tasks within a finite time frame, while simultaneously navigating numerous challenges such as market fluctuations and competitive pressures. This experience aids students in developing scientific time management skills and formulating reasonable career development plans.

4 The Necessity of Sandboxing Teaching in the Teaching of Cost Accounting

4.1 Make up for the status quo of the disconnect between theory and practice

Traditional cost accounting teaching focuses on the teaching of theoretical knowledge, students in the classroom mainly learn cost accounting methods, formulas and conceptual knowledge. However, this teaching method makes students lack of intuitive feeling of the actual cost operation process of the enterprise. For example, when explaining the allocation of manufacturing costs, although students can memorise the formulas of different allocation methods, it is difficult for them to have a clear understanding of how factors such as manufacturing costs affect the allocation results in the actual factory environment. Sand table teaching builds a virtual business scenario for students, letting them play different roles in it, and experience the cost occurrence and flow process in a series of links from raw material purchase, production and processing to product sales. In this process, students need to use the learned theoretical knowledge of cost accounting to make decisions, through this way, students can be abstract theoretical knowledge and practical operation closely integrated, effectively make up for the disconnect between theory and practice.

4.2 Stimulate students' interest and initiative in learning

The content of cost accounting courses is inherently professional and complex. Traditional teaching methods often create a dull classroom atmosphere, resulting in low student engagement. In contrast, sand table projection teaching offers a dynamic and competitive way to present course material, transforming students from passive recipients of knowledge into active participants in a simulated business management environment. This hands-on experience allows students to understand the intricacies of cost accounting through the highs and lows of simulated enterprise operations. As teams compete to achieve superior business performance, they are driven to delve into cost accounting concepts and devise strategies to optimize cost management and enhance their enterprise's competitiveness. This student-centered approach significantly fosters interest and curiosity, shifting the students' mindset from merely wanting to learn to being eager to learn, thereby enhancing the overall learning outcome.

4.3 Conform to the Development Trend of Modern Educational Technology and Teaching Philosophy

The rapid advancement of information technology has significantly expanded the application of modern educational technology in teaching methodologies. The blended teaching model, an innovative fusion of online resources and traditional classroom teaching methods, is emerging as a principal direction for educational reform. This model can be further enriched by integrating practical offline teaching methods such as sand table deduction teaching with online resources to create a more comprehensive and efficient hybrid cost accounting course delivery system. In this arrangement, teachers can utilize online platforms to offer theoretical cost accounting knowledge via lecture videos, electronic textbooks, and case studies, thereby encouraging pre-class study and independent learning among students. Concurrently, practical operations and teamwork learning can

be fostered through offline activities such as sand table deduction teaching to deepen students' comprehension and application of theoretical concepts. This innovative teaching approach, underpinned by modern educational technology and pedagogical concepts, effectively caters to individual student learning needs, enhancing overall teaching quality and efficiency. It also forms a robust foundation for nurturing high-quality cost accounting talents equipped to meet the demands of the contemporary era.

5 Issues to be noted in the blended teaching of sandtray rehearsal

5.1 Adaptability of the teaching aids for sand table deduction and course content

Certain teaching aids, such as sand table deduction, may emphasize the simulation of enterprise strategy or marketing. However, these tools often do not adequately embody the core knowledge points of cost accounting. For instance, in some general-purpose enterprise sandboxes, the cost accounting section may be overly simplified. It may only involve basic calculations of material and labour costs, neglecting to demonstrate important aspects of cost accounting, such as complex allocation methods of manufacturing costs and interactive allocation of auxiliary production costs.

5.2 Moderation of Teacher's Guidance and Intervention

In the instruction of cost accounting using sand table deduction, educators assume dual roles as facilitators and organizers. It is imperative that they provide students with ample autonomy to foster independent thought and decision-making, essential for simulating business operations. However, when students significantly diverge from established cost accounting principles during these simulations, educators must intervene promptly, offering pertinent guidance. Furthermore, educators should introduce thought-provoking questions throughout the process. For instance, posing queries like "How can enterprises enhance their competitiveness through cost control in a saturated market?" can stimulate profound reflection and deepen students' comprehension and application of cost accounting concepts.

5.3 Control of Teaching Time and Progress

The process of cost accounting sand table deduction teaching typically demands an extensive timeframe to successfully complete a comprehensive enterprise operation simulation. This is primarily due to the substantial content inherent in the cost accounting course, which includes not only sand table deduction practice teaching but also theoretical knowledge lectures and case studies. Consequently, at the onset of course design, instructors must strategically allocate teaching time to ensure a seamless integration of sand table deduction teaching with other instructional components, avoiding conflicts. Furthermore, instructors should be prepared to flexibly modify the teaching schedule in response to the actual teaching context. If students exhibit significant difficulty in comprehending particular cost accounting concepts, it may be appropriate to extend the allocated time for that segment, thereby ensuring students can thoroughly understand the relevant knowledge.

6 Conclusion

The use of sand table deduction in the integrated course reform of Cost Accounting has demonstrated remarkable effectiveness. It compensates for the deficiencies inherent in traditional pedagogy, facilitating students' profound understanding of cost accounting knowledge within a simulated business context. This approach significantly enhances their practical and innovative

competencies while fostering teamwork, problem-solving skills, and stimulating student initiative. However, challenges such as the compatibility of teaching aids, quality of teacher guidance, time management, and authenticity of scenarios still persist. Future improvements necessitate the selection of appropriate teaching aids, enhancement of teaching staff quality, optimal time allocation, and the incorporation of real-world case studies to minimize the disparity between students' experiential learning and actual industry practices. Overall, the sand table method holds considerable potential for elevating the quality of cost accounting education and will be instrumental in nurturing professionals if it undergoes continuous refinement.

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