

Digital Teaching Strategy Focusing on 'Practical Learning and Application' through Problem-Based Learning

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Abstract

The rapid development of information technology has gradually penetrated people's work and life through digital methods. Traditional teaching and offline classroom can no longer meet the practical application of digital requirement in higher education disciplines. Therefore, digital teaching has become an important component of teaching. In order to improve digital teaching strategy, this study takes undergraduate accounting students as the research object. Through experiments, this study explores the impact of PBL based digital teaching strategy on the practical learning and application abilities of accounting students, and proposes a problem-based learning (PBL) model based on digital teaching strategy aimed at enhancing students' practical learning and application abilities. It was found that digital teaching strategy, through diverse teaching tools such as online learning platforms, virtual simulation software, and data analysis tools, can not only attract students' attention and provide rich learning resources, but also help them master and apply complex knowledge better by simulating real work environments, enhance their practical operational abilities. In order to leverage the advantages of the two teaching strategies, it is recommended to combine digital teaching with traditional teaching in terms of teaching strategies, develop more comprehensive teaching strategies, comprehensively support students' academic development and practical ability improvement, to meet diverse digital learning requirement.

Keywords: Problem Based Learning (Pbl), Digital Teaching, Practical Learning, Teaching Strategies, Accounting Education

Introduction

With the rapid advancement of information technology, the digitalization of education has become a key direction in the global reform of higher education (Bitar,2024). As an integral part of educational digitalization, digital teaching has transformed traditional teaching strategy by incorporating modern information technology, thereby improving teaching efficiency and educational quality. In this context, digital teaching has gradually become a crucial practice in universities and educational institutions in China. However, how to

effectively enhance the practicality and applicability of learning within digital teaching remains an unresolved challenge (McCarthy,2023).

The accounting discipline, being highly practical and application-oriented, requires students not only to possess solid theoretical knowledge but also to develop strong practical skills and problem-solving abilities. Traditional accounting education in China, which primarily relies on lectures and case studies, while effective in imparting foundational knowledge, faces limitations in cultivating students' application skills and innovative capacities (Rahman,2021). With the progress of digital transformation, accountants need more technological configuration and mastery of horizontal skills, contemporary accounting education should pay more attention to the cultivation of interdisciplinary skills to meet market demand (Carvalho, 2022). Therefore, exploring a new teaching strategy to enhance the practicality and applicability of learning for accounting students holds significant importance. This study is based on problem-based learning, using digital teaching strategy to build a digital teaching environment suitable for students, explore its advantages and improvement strategies compared to traditional teaching strategy.

Problem Based Learning (PBL) is a teaching strategy that drives students to actively learn and integrate theory and practice through virtual problem scenarios or real cases. It emphasizes students' active participation and collaborative learning, which can both effectively improve their self-learning and practical application abilities. The development of modern information technology provides solid technical support for the implementation of the PBL model. Digital teaching tools such as network resources, multimedia technology, and virtual simulation software can break through the limitations of time and space, providing more teaching resources and interactive learning opportunities. It can help teachers create rich teaching contexts, provide diverse learning resources, and support students to engage in self-directed learning and collaborative exploration in digital environments (Dolmans, 2005); Santos-Meneses,2023). Digital teaching environment can not only enhances the interactivity and engagement of the learning process, but also enables real-time monitoring of students' learning processes and personalized guidance through data analysis and learning management systems, both of them can further improving teaching outcomes (Lin,2024). In summary, digital teaching strategy can break through the limitations of time and space, provide richer and more interesting teaching resources, attract students' attention and learning interest, provide one-on-one observation and guidance on students' learning situations, which cannot be achieved solely through traditional teaching.

Therefore, this paper aims to explore PBL-based digital teaching strategy focused on "Practical Learning and Application" in China, validate their effectiveness in accounting education through empirical research, propose corresponding teaching improvement suggestions. Through this study, it is hoped that valuable insights and references can be provided for educational reform in higher education, particularly in accounting programs, to enhance educational quality and promote the comprehensive development of students' competencies.

Literature Review

Problem-Based Learning (PBL)

Problem Based Learning (PBL) is a student-centered teaching strategy that emphasizes promoting learners' knowledge construction and ability development by solving practical problems. PBL was first widely used in medical education and gradually expanded to other disciplinary fields.

PBL is a problem-driven, student-centered interdisciplinary collaboration model that emphasizes practical problem-solving methods. By guiding students to explore and solve problems in real-world contexts, PBL effectively enhances students' autonomous learning abilities and critical thinking skills (Barrows, 1986; Huang, 2024). PBL can promote students' knowledge application in complex situations and enhance their ability to solve practical problems. Additionally, PBL can effectively improve students' learning mobility and self-regulation abilities (Hmelo Silver, 2004; Ismail, 2018). PBL is an effective teaching method that can cultivate independent research skills and establish sustainability related frameworks. Practical accounting knowledge and motivation for students to engage deeply in practice (Wyness, 2018). PBL plays a crucial role in cultivating skills such as questioning, teamwork, and problem-solving. The effectiveness of questioning is crucial as it is a developmental skill that is rarely emphasized in accounting education. Successfully implementing PBL in accounting through 'learning by doing' may be a catalyst for better learning outcomes and help improve the learning outcomes of accounting graduates (Stanley, 2012). Combining information technology, the PBL model not only enhances students' online collaborative learning abilities, but also effectively promotes their deep understanding and application of knowledge (Lin, 2024).

Digital Teaching

Due to the continuous advancement of information technology, digital teaching has become an important component of modern education and a hot topic in the field of education. It has great potential in improving teaching effectiveness and learning experience (He, 2024). By introducing various information technology tools, traditional teaching strategy have been changed, the interactivity and personalization of teaching have been improved.

Digital teaching tools typically refer to platforms and resources that utilize information technology and digital assets to support and enhance teaching and learning. These tools include online learning platforms, multimedia content, virtual laboratories, social learning platforms and so on. Digital teaching tools are not merely aids for teaching but represent a transformative force that redefines teaching models, enabling improved learning outcomes across various academic disciplines (Bower, 2017). The online learning platforms with interactivity and entertainment can significantly improve students' participation, learning interest and academic performance (Han, 2024). Among them, multimedia content can enhance students' learning outcomes through rich visual and auditory stimuli, help them apply theoretical knowledge to practice better (Mayer, 2019). The development of digital teaching strategy has not only changed the presentation of teaching content, but also the form of teacher-student interaction, which helps to achieve more personalized learning experiences. The application of digital media and interactive e-learning based on big data platforms in the teaching process can promote the sharing of educational resources, achieve collaborative learning, support the development of more efficient and effective educational

models(Laurillard, 2002;Huang, 2024). The digital teaching form, especially the blended learning mode, is superior to traditional teaching in promoting students' knowledge mastery and improving learning outcomes. Blended Learning, as a new form of digital teaching, has great potential for transformation in higher education. The blended learning strategy combines the advantages of face-to-face teaching and online teaching, which can significantly improve the flexibility of teaching and students' learning autonomy (Means, 2009; Garrison,2008; Pimdee,2024). As a model of blended learning, the combination of virtual reality (VR) and artificial intelligence (AI) technology provides a new approach to problem-based learning (PBL) in practice and application. The VR teaching method, through immersive experiences and AI algorithm support, effectively enhances students' practical skills and problem-solving abilities in near-real-world scenarios. This digital teaching method not only enriches teaching tools but also improves teaching quality, aligning with the principles of PBL. It helps students better grasp and apply knowledge in practical situations (Gong, 2021). The application of digital tools such as virtual reality (VR) and online seminars in blended learning can effectively enhance students' learning experience. In practical courses, VR technology simulates real-world learning scenarios to help students understand and apply the knowledge what they have learned. It provides a more flexible and immersive learning experience, which helps to improve students' learning motivation and knowledge application ability (Nortvig et al., 2020).

Problem-Based Learning (PBL) and digital teaching both play crucial roles in modern education. PBL enhances students' self-directed learning and problem-solving skills through a problem-driven approach, while digital teaching optimizes interactivity and personalization in the learning process through the application of information technology. The combination of these two teaching strategies, especially in practice-oriented disciplines such as accounting education, is expected to achieve more significant educational outcomes.

Methodology

This study adopts an experimental research method, comparing the learning performance of an experimental group and a control group under different teaching strategies to explore the impact of PBL-based digital teaching strategy on enhancing the practical learning and application abilities of accounting students (Wang,2024). The experiment spans one semester, totaling 16 weeks.

Research Design

Teaching Strategies for the Experimental Group

To verify the impact of digital teaching on students' learning situation, this study selected students who implemented digital teaching throughout the semester, that is, fully digital classrooms, as the experimental group for research. In the teaching design of this study, firstly, the teacher carefully designed accounting cases or problem scenarios with practical significance based on the course objectives and teaching content, such as enterprise financial statement analysis and tax planning, to promote students' understanding and application of practical problems. Secondly, students used self-learning activities such as literature review, online resource utilization, watched instructional videos to collect and organize information and materials needed to solve problems, thereby enhancing their self-learning abilities. Subsequently, students were divided into groups of 4 to 6 people to have in-depth discussions and exchanges around the proposed problems, jointly develop feasible solutions. Under the

guidance of teachers, students used accounting software or simulation platforms to implement and verify the feasibility of their solutions. Finally, at the end of each learning unit, students summarized and reflected on the learning process, shared their experiences and gains, made improvements based on feedback from teachers and peers to consolidate their knowledge and further enhance their application abilities. In terms of grades, students ensured their mastery and internalization of teaching content through homework assignments, stage tests, and final exams.

In the digital teaching design of this study, digital classroom was the most important form of teaching, which was an important role by providing rich course resources, online testing, and discussion forums to support students' self-directed learning and communication, enhancing the interactivity and flexibility of learning. At the same time, virtual simulation software such as financial statement simulation systems and audit simulation systems, as important tools for practical teaching, provided students with training opportunities that are close to real environments and enhance their practical operational abilities. Data analysis tools collected and analyzed students' learning data through learning management system, provided personalized learning support and guidance, effectively promoted the continuous improvement of students' learning outcomes.

Teaching Strategies for the Control Group

In the control group teaching design of this study, a teaching method combining traditional classroom teaching with case analysis was adopted. Firstly, teachers delivered course content through systematic lectures, while students gained preliminary knowledge through listening and taking notes. In the classroom, teachers led case analysis and discussion, guided students to participate in problem exploration and thinking, aimed to enhance their understanding and application of theoretical knowledge. Finally, students consolidated their knowledge by completing homework, stage tests, and final exams to ensure mastery and internalization of the teaching content.

Population&Sampling

This study selected undergraduate students majoring in accounting from a Chinese university who enrolled in 2022 for teaching, collected and analyzed data on the effectiveness of problem-based learning (PBL) based digital teaching strategy and traditional teaching strategy. The total of 80 students were selected as the research subjects in the class where the researcher conducted teaching. 40 students who implemented digital classroom teaching were selected as the experimental group, 40 students who implemented traditional classroom teaching were selected as the control group. The experimental group students were taught using digital teaching tools (Bower, 2017) combined with PBL mode (Lin, 2024), while the control group was taught using a combination of traditional teaching lectures and paper textbooks.

Instrument

This study used convenience sampling to conduct the research. Convenience sampling was a non-probability sampling method that relied on the judgment of researchers to select samples from easily accessible populations based on the characteristics of speed and convenience. It did not require spending a lot of time and resources to access difficult to obtain samples, but directly selected from available populations (Etikan,2015). In the data collection process of

this study, the scope of data collection was the classes taught by the researcher this semester, which had certain similarities in teaching content and student backgrounds. On this basis, the class of 40 students using traditional teaching strategy and another class of 40 students using digital teaching strategy were selected for comparative research. To comprehensively evaluate the effectiveness of two teaching strategies, this study used a questionnaire survey method to collect data from multiple dimensions, including students' learning interests, self-directed learning behavior, knowledge mastery, learning satisfaction, and final grades (Bou-Hamad,2024). The questionnaire included single choice question questions and multiple-choice questions, covered students' interest in accounting courses, enthusiasm for active learning, help of teaching tools and methods, improvement of learning ability, and overall satisfaction of students. After collecting the questionnaire, quantified the results and used SPSS for reliability analysis and assignment analysis.

Table 1

Questionnaire Survey Design for Digital/Traditional Classroom

Research Title	Research Content
Interest	The level of interest in accounting courses
Proactiveness	The level of proactiveness in accounting studies
Helpfulness	The degree of helpfulness of classroom teaching in learning
Enhances Interest	The degree to which classroom teaching enhances learning interest
Mastery	The degree to which classroom teaching helps in mastering knowledge
Application	The degree of assistance in applying accounting knowledge
Satisfaction	Overall satisfaction with the classroom strategy
Final grades	Final grades in classrooms

The number of digital classroom survey questionnaires distributed was 20, and 20 were collected, involving 8 projects. In the experimental group, the questionnaire survey results showed that students generally showed a high level of recognition for digital teaching tools. For example, 70% of students reported frequently using online learning platforms during their self-directed learning process, 90% of students used virtual simulation software, and 60% of students used data analysis tools. In addition, 75% of students believed that digital teaching strategy have significantly increased their interest and participation in learning. However, in terms of overall satisfaction, only 40% of students expressed "very satisfied" or "somewhat satisfied" with the digital teaching strategy, indicated that although digital teaching had to some extent stimulated students' interest in learning, there was still room for improvement in meeting students' personalized needs and expectations.

The number of traditional classroom survey questionnaires distributed was 20, and 20 were collected, involving 8 items. The questionnaire results of the control group reflected that although traditional classroom teaching is more effective in imparting knowledge, its effectiveness in stimulating students' learning interest and self-directed learning motivation was limited. Only 10% of students expressed a "strong interest" in accounting courses, while 45% of students held a moderate interest. Meanwhile, 35% of students reported being "always" proactive in the learning process, while 20% of students reported being

"occasionally" involved in learning. In addition, 45% of students believed that traditional teaching strategy can help improve their accounting learning abilities, but only 35% of students expressed overall satisfaction as "very satisfied", indicated a certain contradiction between teaching effectiveness and student satisfaction in traditional teaching strategy.

The Cronbach. α coefficient is used to measure the internal consistency of measurement tools, and a coefficient value above 0.7 is generally considered to have good reliability. In the reliability analysis of digital classroom, 40 questionnaires were distributed and 40 were recovered, involving 8 items. By calculation, the Cronbach. α coefficient is 0.889, indicated that the measurement tools of digital classrooms have high internal consistency and can stably reflect students' performance or attitudes in the teaching environment.

Table 2

Cronbach. α coefficient of Digital Classroom

	Sample Size	Item	Cronbach. α coef
Digital Classroom	40	8	0.889

In the reliability analysis of traditional classroom, 40 questionnaires were distributed and 40 were recovered, involving 8 items. The Cronbach. α coefficient is 0.918, slightly higher than the reliability coefficient of digital classrooms. This value shows that traditional classroom measurement tools also have high internal consistency and can reliably reflect students' performance in traditional teaching environments.

Table 3

Cronbach. α coefficient of Traditional Classroom

	Sample Size	Item	Cronbach. α coef
Traditional Classroom	40	8	0.918

Data Analysis Method

The reliability coefficients of both digital classrooms and traditional classrooms are at a high level, which indicated that the measurement tools used in both teaching modes have good reliability and can provide consistent and reliable evaluation results. Although the reliability coefficient of traditional classrooms is slightly higher than that of digital classrooms, there is little difference between the two results, indicated that measurement tools have relatively consistent performance in different teaching environments. This provides a scientific basis for evaluating the effectiveness of different teaching strategies, which lays a reliable foundation for further research.

Based on the data collection results, the five point scoring method is used to calculate the weighted index of teaching outcomes between digital classrooms and traditional classrooms.

The five point scoring system was improved by American social psychologist Likert in 1932 based on the original total sum scale. It consists of a set of statements, each with five answer options: strongly agree, agree, not necessarily, disagree, strongly disagree, denoted as 5, 4, 3, 2, 1, respectively(Shrestha, 2024).

Table 4
Level-Scoring Table for Digital/Traditional Classroom

Research Title	Level				
	5	4	3	2	1
Interest	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Proactiveness	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Helpfulness	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Enhances Interest	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Mastery	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Application	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Satisfaction	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Final grades	Strongly agree	Agree	Neutral	Disagree	Strongly disagree

Findings and Discussion

This questionnaire provides 5 options with a certain ranking, namely Very Satisfied, Satisfied, Neutral, Unsatisfied, Very Dissatisfied. According to the Likert's five order scale, they are assigned values of 5, 4, 3, 2, and 1, respectively. This means assigning 5 points to Strong agreement, 4 points to Agreement, 3 points to Neutral, 2 points to Disagree, and 1 point to Strong disagreement. The statistical percentages of the questionnaire results for Interest, Proactiveness, Helpfulness, Enhances Interest, Mastery, Enhances Ability, Satisfaction, and Final grades are multiplied by the assigned values to calculate the final results. The score for the arch title is shown in the table below.

Table 5
Weighted Score Table for Digital/Traditional Classroom

Research Title	Digital Classroom	Traditional Classroom	Research Content
Interest	3.7	3.25	The level of interest in accounting courses
Proactiveness	3.5	3.65	The level of proactiveness in accounting studies
Helpfulness	3.6	3.35	The degree of helpfulness of classroom teaching in learning
Enhances Interest	3.9	3.65	The degree to which classroom teaching enhances learning interest
Mastery	3.6	3.5	The degree to which classroom teaching helps in mastering knowledge
Application	4.7	3.95	The degree of assistance in applying accounting knowledge
Satisfaction	3.4	3.9	Overall satisfaction with the classroom strategy
Final grades	3.75	3.7	Final grades in classrooms

In terms of stimulating students' interest and enhances interest in learning, based on weighted scores, digital classrooms performed better than traditional classrooms in stimulating students' interest in learning. Digital classrooms can attract students' attention and improve their learning motivation better through diverse teaching tools and interactive methods. In contrast, although traditional classrooms had a certain degree of systematicity in theoretical teaching, their effectiveness in stimulating students' interest in learning was relatively limited due to the lack of interactivity and innovation. Therefore, digital classrooms demonstrated greater advantages in cultivating students' interest and motivation for course content (Han,2024).

In terms of self-directed learning ability, digital classrooms scored slightly lower than traditional classrooms. The digital classroom relied on computers and multimedia software, with high efficiency and fast upgrading and updating speed. However, compared to traditional classrooms, the teaching materials were not rich and timely enough. Some online learning software even lacks operation instructions, relied solely on teachers' oral explanations. Some students had limited computer skills or did not have personal computers, so their motivation for active learning was slightly insufficient, combining digitalization with traditional classrooms can better meet teaching requirements (Garrison,2008; Pimde,2024).

In terms of helpfulness, digital classrooms scored slightly higher than traditional classrooms. Digital classrooms can provide students with richer learning resources and more flexible learning methods through diverse teaching tools, such as online learning platforms, virtual simulation software, and data analysis tools, thereby helping them understand complex accounting knowledge better (Bower,2017). The real-time feedback function and interactive design of these tools further enhanced students' learning experience, enabled them to more effectively apply theoretical knowledge to solve practical problems (Huang,2024). In contrast, traditional classrooms mainly rely on teachers' lectures and the support of paper textbooks, which had advantages in terms of systematic and structural knowledge transmission. However, due to the lack of digital tools to assist, traditional classrooms were relatively inadequate in providing personalized learning support and instant feedback.

In terms of knowledge mastery, digital classrooms scored slightly higher than traditional classrooms. Digital tools such as virtual simulation software and data analysis platforms helped students apply their learned knowledge in close to real situations, enhanced their practical application abilities (Means,2009). Relatively speaking, although traditional classrooms had certain advantages in the systematic transmission of knowledge, their effectiveness in cultivating practical operation and knowledge application abilities were not as significant as digital classrooms. Therefore, digital classrooms had greater potential in promoting the integration of theory and practice for students.

In terms of application ability, digital classrooms scored significantly higher than traditional classrooms. This result indicated that digital teaching had significant advantages in enhancing students' ability to apply knowledge (Mayer, 2019). By using virtual simulation software and data analysis tools, digital classrooms can provide students with simulated environments that were close to actual work scenarios, enhanced their ability to apply learned knowledge in real-life situations. These tools not only helped students deepen their understanding of theoretical

knowledge, but also enhanced their ability to solve practical problems. In contrast, although traditional classrooms had their own unique systematic and structural approach to imparting theoretical knowledge, their teaching strategies were relatively single and lack interactive and practical operation links, resulting in relatively weak cultivation of students' practical application abilities.

In terms of learning satisfaction, although digital classrooms performed better than traditional classrooms in multiple aspects, the weighted scored difference between the two is not significant in overall learning satisfaction. Traditional classrooms had still gained recognition from some students, especially those who were accustomed to traditional learning modes, due to their stability and systematicity in knowledge transmission. Although digital classrooms had obvious advantages in innovation and interactivity, due to the complexity of technology used and insufficient satisfaction with personalized needed, some students may not be satisfied with them as expected. Therefore, further optimization was needed for the teaching design of digital classrooms (Anderson, 2008; Panlumlars,2015).

In terms of learning outcomes, digital classrooms had a slight advantage in the weighted score comparison of final grades. This advantage may stem from the diverse learning tools and resources used in digital teaching, especially the application of virtual simulation software and data analysis platforms, which can provide students with richer and more interactive learning experiences, thereby effectively consolidating their knowledge mastery and application abilities. Digital classrooms provided personalized learning support and instant feedback mechanisms to help students identify and address any gaps before the end of the course, ultimately leading to better performance in final exams (Lin,2024). In contrast, although traditional classrooms had certain advantages in the systematic and structured transmission of knowledge, especially suitable for meeting traditional exam requirements, their teaching forms were relatively fixed, lacking flexibility and personalized support, which may limit students' performance improvement in exams.

Therefore, although the difference in final grades between the two was not significant, digital classrooms had demonstrated their potential in improving students' academic performance through flexible teaching methods and abundant resource support. This result suggested that in future teaching practices, we can consider further integrating the advantages of digital teaching and optimizing traditional teaching strategy to more comprehensively support students' academic development.

Conclusion

The aim of this study is to compare and evaluate the effectiveness of digital teaching strategy and traditional teaching strategy in stimulating students' interest in learning, enhance their self-directed learning ability, knowledge mastery and application ability, learning satisfaction, and academic performance. Through in-depth analysis of two teaching strategies, comparing the learning situations of students participating in digital classrooms and traditional classrooms, this study explores their respective advantages and disadvantages, in order to provide empirical support and theoretical basis for optimizing teaching strategies, which enhanced students' comprehensive learning experience and academic achievements. The research results showed that digital classrooms perform better than traditional classrooms in stimulating learning interest, enhanced knowledge mastery and application abilities, but

there was still room for improvement in self-directed learning ability and learning satisfaction. Overall, digital teaching strategy had significant advantages in promoting students' academic performance. To further enhance teaching effectiveness, interactive elements and technical support should be added to digital teaching strategy, so as to ensure that students can fully utilize digital resources. At the same time, personalized learning support and diverse evaluation mechanisms should be provided by combining the structured advantages of traditional teaching strategy. In the future, research and practice should strive to integrate the advantages of digital teaching strategy and traditional teaching strategy, develop more comprehensive teaching strategies, comprehensively support students' academic development and practical ability improvement, and meet diverse learning needs.

Although this study had achieved certain results in exploring the teaching effectiveness of digital teaching strategy and traditional teaching strategy, there were still several limitations. Due to the fact that this study was based on undergraduate accounting teaching, there may be some limitations in the research results in terms of discipline and educational background. Further research can be conducted on the applicability of digital teaching strategy in other disciplines or different educational contexts in the future. Although there have been innovations in the teaching tools and resources used in the research, their effectiveness is limited by the maturity of technology and the acceptance of students. Therefore, further optimizing the user experience of digital tools remains an important direction for future instructional design.

References

- Bitar, N., & Davidovich, N. (2024). Transforming pedagogy: The digital revolution in higher education. *Education Sciences*, 14(8), 811.
- McCarthy, A. M., Maor, D., McConney, A., & Cavanaugh, C. (2023). Digital transformation in education: Critical components for leaders of system change. *Social Sciences and Humanities Open*, 8(1), 100479.
- Rahman, M. W., Rahman, M. K., & Rahaman, M. M. (2021). Exploring the effective teaching methods for accounting subject in secondary schools: a case study. *IOSR Journal of Humanities and Social Science*, 26(4), 50-57.
- Carvalho, C., & Almeida, A. C. (2022). The adequacy of accounting education in the development of transversal skills needed to meet market demands. *Sustainability*, 14(10), 5755.
- Dolmans, D. H. J. M., De Grave, W. S., Wolphagen, I. H. A. P., & Van Der Vleuten, C. P. M. (2005). Problem-based learning: Future challenges for educational practice and research. *Medical Education*, 39(7), 732-741.
- Santos-Meneses, L. F., Pashchenko, T., & Mikhailova, A. (2023). Critical thinking in the context of adult learning through PBL and e-learning: A course framework. *Thinking Skills and Creativity*, 50, 101358.
- Lin, Y. L., & Wang, W. T. (2024). Enhancing students' online collaborative PBL learning performance in the context of coauthoring-based technologies: A case of wiki technologies. *Education and Information Technologies*, 29(2), 2303–2328.
- Barrows, H. S. (1986). A Taxonomy of Problem-Based Learning Methods. *Medical Education*, 20(6), 481-486.

- Huang, J.-W., & Liao, Y.-M. (2024). Application of problem-based learning in marketing studies combined with silver-haired business opportunities. *Thinking Skills and Creativity*, 53, 101571.
- Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review*, 16(3), 235-266.
- Ismail, N. S., Harun, J., Zakaria, M. A. Z. M., & Md. Salleh, S. (2018). The effect of Mobile problem-based learning application DicScience PBL on students' critical thinking. *Thinking Skills and Creativity*, 28, 177-195.
- Wyness, L., & Dalton, F. (2018). The value of problem-based learning in learning for sustainability: Undergraduate accounting student perspectives. *Journal of Accounting Education*, 45(4), 1-14.
- Stanley, T., & Marsden, S. (2012). Problem-based learning: Does accounting education need it? *Journal of Accounting Education*, 30(4), 389-402.
- He, L., & Hak-soon, Y. (2024). Research on the E-learning platform for art teaching and immersive digital entertainment experience based on improved neural networks. *Entertainment Computing*, 54, 100768.
- Bower, M. (2017). Design of technology-enhanced learning: Integrating research and practice. *Emerald Publishing*.
- Han, X. (2024). Research on English E-learning teaching strategy based on digital entertainment and gamification experience: Interactive teaching experience. *Entertainment Computing*, 54, 100867.
- Mayer, R. E. (2019). Multimedia learning in practice: Effective strategies to improve understanding and application. *Journal of Computer Assisted Learning*, 35(6), 663-675.
- Laurillard, D. (2002). *Rethinking university teaching: A conversational framework for the effective use of learning technologies (2nd ed.)*. Routledge.
- Huang, Y., Lin, M., & Liu, X. (2024). Digital media and interactive E-learning application in art teaching process based on big data platform. *Entertainment Computing*, 54, 100737.
- Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies. *U.S. Department of Education*.
- Garrison, D. R., & Kanuka, H. (2004). Blended Learning: Uncovering Its Transformative Potential in Higher Education. *The Internet and Higher Education*, 7(2), 95-105.
- Pimdee, P., Sukkamart, A., Nantha, C., Kantathanawat, T., & Leekitchwatana, P. (2024). Enhancing Thai student-teacher problem-solving skills and academic achievement through a blended problem-based learning approach in online flipped classrooms. *Heliyon*, 10(e29172).
- Gong, Y. (2021). Application of virtual reality teaching method and artificial intelligence technology in digital media art creation. *Ecological Informatics*, 61, 101304.
- Nortvig, A.-M., Petersen, A. K., Helsinghof, H., & Brænder, B. (2020). Digital expansions of physical learning spaces in practice-based subjects - Blended learning in Art and Craft & Design in teacher education. *Computers & Education*, 146, 104020.
- Wang, J. (2024). Application of digital media entertainment technology based on soft computing in immersive experience of remote piano teaching. *Entertainment Computing*, 54, 100822.
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2015). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4.

- Bou-Hamad, I., & El Danaoui, M. (2024). Exploring the effects of e-learning readiness and psychological distress on graduate students' e-learning satisfaction during the COVID-19 pandemic: A descriptive study from Lebanon. *Heliyon*, 10(e33257).
- Shrestha, S., & Dahlke, S., & Butler, J. I., & Hunter, K., & Fox, M. T., & Davidson, S., & Chasteen, A. L., & Moody, E. (2024). Nursing students' perceptions on a pain management e-learning module: An exploratory quantitative study. *Pain Management Nursing*, 25(2), e138-e143.