

Exploration and practice of blended teaching based on the cultivation of self-directed learning competencies

Peng Zhang, and Liancheng Xu *

School of Information Science and Engineering, Shandong Normal University, China

Abstract. Cultivating self-directed learning is a key goal in secondary vocational education. Blended learning, combining traditional and online instruction, requires focusing on autonomous skill development. By optimizing resources, redesigning tasks, emphasizing key offline instruction, and enhancing evaluations, the authors developed a blended learning model implemented in the Office Software Advanced Applications course.. Practical results demonstrate that the constructed blended teaching design effectively enhances self-directed learning competencies in aspects such as information acquisition and assimilatn, self-management and regulation, selection of learningmethods and strategies, as well as self-reflection and evaluation.

1 Introduction

With the continuous and in-depth study of blended teaching, its teaching mode and link are also constantly developing^[1]. self-directed learning competency is an important ability for students, and both online and offline teaching in blended teaching have certain requirements for students' self-directed learning competency^[2]. The teaching links and self-directed learning competency, which needs autonomous management, autonomous access, self-regulation and self-evaluation, have a consistency^[3].

2 Related work

Blended teaching and learning has gained increasing attention with the advancement of social informatization, sparking diverse perspectives among scholars^[4]. Researchers generally acknowledge the complexity of implementing effective blended instruction, which demands substantial collaborative efforts between teachers and students supported by multimedia equipment^[5]. Notably, Luis, Juan Carlos, and Jose^[6] emphasize the critical role of teacher-student interaction, extracurricular expansion, and instructional design in this model, particularly advocating for optimized offline classroom practices.

Self-directed learning competencies has long been recognized as a crucial indicator for evaluating teaching effectiveness^[7]. As a vital competency for vocational students, it

* Corresponding author: lchxu@163.com

significantly impacts learning outcomes, prompting scholars to focus on its cultivation. Existing research demonstrates that both online autonomous learning phases and post-class assignment extensions in blended teaching can enhance students' self-learning competencies [8]. Some researchers emphasize that the establishment of self-learning learning competencies must manifest through external behaviors, such as self-determined learning objectives[9]. Other studies reveal that blended teaching improves students' capacity in understanding and assimilating conceptual information, which correlates with their confidence levels and self-efficacy[10].

Building on existing research, this study developed a blended teaching model focused on cultivating self-directed learning competencies and implemented it in the vocational course Advanced Office Software Applications. A controlled experiment was conducted to validate the feasibility of the proposed model.

3 Construction of blended teaching mode based on the cultivation of self-directed learning competencies

3.1 Framework of the blended learning model for cultivating self-directed learning competencies

The constructed blended teaching process centered on developing self-directed learning competencies comprises six phases: pre-class preparation, online instruction, offline instruction, post-class assignments, teaching evaluation, and teaching reflection. Each phase involves corresponding activities for both instructors and students, as illustrated in Figure 1.

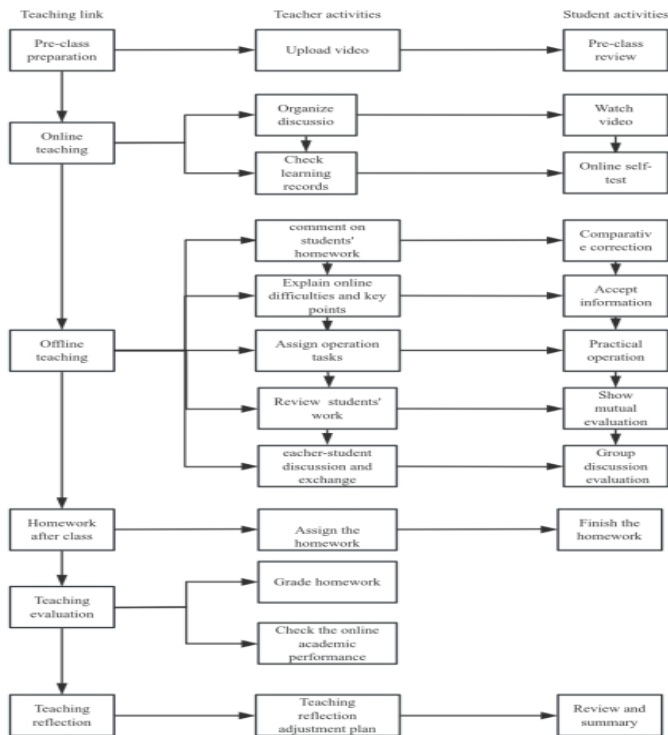


Fig. 1. Teaching design process.

Table 1. Restructured instructional content.

Textbook knowledge points	Teaching Case
Create and save Word documents, get familiar with the basic Word interface, edit text content, and find and replace text.	Enter " Thoughts in a Quiet Night " into Word (2 class hours)
Character formatting, paragraph formatting, setting symbols and numbering	Write a recruitment notice (4 class hours)
Character and paragraph formatting, page formatting, setting headers and footers.	Make a Chinese language test paper (4 class hours)
Create and edit tables in Word, set table formats.	Design a personal resume form (4 class hours)
Basic calculations of table data in Word.	Community book donation statistics form (3 class hours)
Text and picture layout, insert text boxes and, insert art words, insert pictures, set first-line drop, set borders and watermark.	Design a blackboard newspaper with the New semester starts" (6 class hours)

Based on the current textbook for the secondary vocational "Advanced Office Applications" course, the author redesigned Word content (Table 1). Using "Writing a Job Posting" as a case study, teaching resources were consolidated with 1 online hour and 1 hour per knowledge point for three topics.

3.2 Optimization of instructional resources

Online resources include instructional videos, discussion topics, and digital exercises. Teachers uploaded three knowledge point videos for "Job Posting Creation" with embedded questions requiring correct answers to proceed. The assignment mandates formatted title and job description editing.

Textbooks form core offline resources, supplemented by in-class exercises and homework. Teachers also extend instruction with information technology-related knowledge.

3.3 Improved arrangement of teaching tasks

Learning tasks are assigned to guide student engagement. The online phase comprises: 1) video viewing (20 min, repeatable), 2) topic discussions (10 min), and 3) foundational exercises (10 min). Teachers monitor participation via backend analytics, documenting error trends. Post-attendance verification, instruction includes: homework review (5 min), error clarification (3 min), and practical tasks for job posting formatting (12 min). Random student demonstrations with feedback (12 min) and open discussions (8 min) conclude the session.

Learners design personalized plans for autonomous online study, enhancing time management skills through structured task scheduling. Real-time access to learning outcomes enables self-regulated adjustments. Progress milestones reinforce self-efficacy, establishing a virtuous cycle that strengthens independent learning capabilities.

3.4 Offline instruction on key challenges and achievement presentation

Following attendance confirmation, instructors analyze prevalent errors from prior assignments while acknowledging exemplary student performance to reinforce engagement. Targeted remediation addresses identified knowledge gaps from online learning activities. Subsequently, learners undertake structured practice in job posting formatting under monitored time constraints (12 min). Randomized selection for task demonstrations

facilitates comparative evaluations, with instructors providing synthesizing feedback to foster pedagogical reflection. Concluding discussions integrate homework assignments (Textbook P37, Q1-5) alongside real-time academic consultations.

Students engage in comparative analysis of peer exemplars during feedback cycles, systematically internalizing quality benchmarks. Autonomous task execution under temporal parameters cultivates self-regulatory competencies, while dual-layer assessment (self-appraisal vs. peer benchmarks) enhances metacognitive awareness. Collaborative troubleshooting sessions operationalize gap-reduction strategies through scaffolded peer interactions. Evidence-based time allocation strategies are emphasized, including productivity-optimized scheduling and diagnostic problem tagging for iterative improvement.

3.5 Establishing a comprehensive evaluation system

1. Diagnostic evaluation was conducted to establish baseline student profiles. Prior to instructional intervention, self-regulated learning capabilities were assessed via questionnaire in two intact classes (controlling for extraneous variables). The validated instrument comprised 20 multiple-choice items across four dimensions (see Table 2), employing a Likert five-point scale (1=strongly disagree to 5=strongly agree) with aggregate scores ranging 20-100. The questionnaire has been tested and its reliability and validity meet the requirements.

Table 2. Survey corresponding table of self-directed learning capability.

Dimension	Question number	Note
Information acquisition and assimilation	1,2,3,4,5	5 questions, total 25 points
Self-management and regulation	6,7,8,9,10	5 questions, total 25 points
Learning strategies and methods	11,12,13,14,15	5 questions, total 25 points
Self-reflection and evaluation	16,17,18,19,20	5 questions, total 25 points

The questionnaire assessed four dimensions: information acquisition and assimilation (students' ability to obtain and integrate information), self-management and regulation (planning, adjusting, and executing learning schedules), learning strategy application (selecting methods based on content and personal needs), and self-reflection and evaluation (analyzing and assessing learning outcomes). A pre-test measuring self-directed learning levels was administered to both the experimental and control classes (45 students each).

2. Process evaluation focuses on students' performance during learning. The continuous accumulation of online achievements can enhance students' self-efficacy and motivate persistent learning. Classroom works and homework completion reflect current chapter mastery, helping teachers adjust subsequent teaching plans while enabling student self-assessment. Teachers randomly select assignments for final grading and incorporate routine exercises into final exams without prior notice, encouraging consistent high-quality work. Summative evaluation includes post-test assessments of autonomous learning capabilities and final examination results.

3. Students' self-directed learning competencies post-test and final exam scores belong to summative evaluation.

3.6 Teaching reflection and summary

Post-instruction reflection enables teachers to refine subsequent plans by synthesizing personal experiences, encountered challenges, and student performance data from homework and online assessments..

Students review and consolidate knowledge through self-evaluation of classroom discussions, error patterns, and key concepts, allowing them to address issues promptly, optimize learning strategies, and strengthen metacognitive skills while preventing cumulative knowledge gaps.

4 Analysis of teaching practice results

To validate whether the constructed blended learning model enhances students' autonomous learning capabilities, a controlled experiment was conducted with two parallel classes (each comprising 45 second-year students) at a secondary vocational school. The control class implemented the constructed blended learning approach, while the experimental class received traditional lecture-based instruction.

4.1 Pre-test of self-directed learning competency

In order to carry out the research smoothly, a pre-test was conducted on the self-directed learning competency of the students in the two classes before the practice to understand whether there was a difference in the initial level of self-directed learning competency between the two classes of students. After the questionnaire was collected, the data was tested independent sample t-test by using SPSS software, and the results were shown in Table 3.

As shown in Table 3, the two classes exhibited a statistically significant difference only in information acquisition and assimilation ($P < 0.05$), while no significant differences were observed in other dimensions (all $P > 0.05$). This indicates comparable initial levels of autonomous learning abilities between the two classes prior to the instructional intervention.

Table 3. Pre-test analysis of self-directed learning competency.

	Group (Average± SD)		t	p
	Experimental group	Control group		
Information acquisition and assimilation	13.91±0.319	15.02±0.249	-2.744	0.007
Self-management and regulation	15.11±0.429	15.51±0.418	-0.668	0.506
Learning strategies and methods	15.93±0.357	16.18±0.350	-0.489	0.626
Self-reflection and evaluation	16.27±0.280	16.42±0.299	-0.380	0.705
Total score	61.22±0.931	63.13±0.856	-1.511	0.134

4.2 Post-test of self-directed learning competency

After a month of teaching practice, the self-directed learning competency of the students in the two classes was tested again, and the data of the self-directed learning competency the students in the two classes was tested by Spss software, and the results are shown in Table 4.

It can be seen from Table 4 that the average value of self-directed learning competency of students in the experimental class was 68.4, and that of the control class was 63.33. The t value was greater than 0, and the two-tailed significance value was less than 0.05. The data show that after the teaching practice, the self-directed learning competency of the students in the experimental class has a significant difference the students in the control class using traditional teaching, and the average value of self-directed learning competency of the students in the experimental group is significantly higher than that of the control. It can be concluded that the blended teaching practice carried out in the experimental class has a good effect on improving students' self-directed learning competency.

Table 4. Post-test analysis of self-directed learning competency.

	Group (Average± SD)		t	p
	Experimental group	Control group		
Information acquisition and assimilation	16.89±0.146	15.38±0.270	4.917	<0.001
Self-management and regulation	17.13±0.184	15.64±0.350	3.766	<0.001
Learning strategies and methods	16.96±0.191	16.02±0.334	2.427	0.017
Self-reflection and evaluation	17.07±0.219	16.29±0.280	2.189	0.031
Total score	68.04±0.410	63.33±0.762	5.442	<0.001

5 Conclusion

This study mainly constructed a blended teaching design based on the cultivation of self-directed learning competency, and carried out teaching practice in the course of Advanced Application of Office Software in a certain secondary vocational school. One of the classes adopted the blended teaching method constructed as the experimental group, and the other class adopted the traditional teaching as the control group. After the completion of the phased teaching practice, the pre-and post-test levels of the self-directed learning competency of the students in two classes were analyzed.

The experimental results demonstrated that the average level of self-directed learning abilities in the experimental class was significantly higher than that in the control class. These findings lead to the conclusion that the constructed blended learning design effectively enhances students' self-directed learning competencies. The implementation of this blended learning model in the Advanced Office Software Applications course at the secondary vocational level holds exemplary significance for IT-related curriculum instruction. It provides valuable references and methodological insights for promoting pedagogical reforms in information technology education within secondary vocational institutions.

References

1. J. Cheng, Blended learning reform in English viewing, listening and speaking course based on the POA in the post-pandemic era, in *Frontiers in Education* (Frontiers Media SA, 2025), Vol. 10, p. 1512667
2. X. Wang, W. Zhang, Improvement of Students' Autonomous Learning Behavior by Optimizing Foreign Language Blended Learning Mode, *Eur. Phys. J. Educ.* **12**, 1: 28-38 (2022)
3. T. D. H. Tong, B. P. Uyen, L. K. Ngan, The effectiveness of blended learning on students' academic achievement, self-study skills and learning attitudes: A quasi-experiment study in teaching the conventions for coordinates in the plane, *Heliyon* **8**, 12 (2022)
4. S. Hrastinski, What do we mean by blended learning?, *TechTrends* **63**, 5: 564-569 (2019)
5. K. L. Dangwal, Blended learning: An innovative approach, *Universal Journal of Educational Research* **5**, 1: 129-136 (2017)
6. L. Matosas-Lopez, J. C. Aguado-Franco, J. Gomez-Galan, Constructing an Instrument with Behavioral Scales to Assess Teaching Quality in Blended Learning Modalities, *J. New Approaches Educ. Res.* **8**, 1: 1-15 (2019)
7. A. L. Smith, J. R. Paddock, J. M. Vaughan, D. W. Parkin, Promoting nursing students' chemistry success in a collegiate active learning environment: "If I Have Hope, I Will Try Harder", *J. Chem. Educ.* **95**, 1929-1938 (2018)

8. F. Shang, C. Y. Liu, Blended learning in medical physiology improves nursing students' study efficiency, *Adv. Physiol. Educ.* **42**, 711–717 (2018)
9. M. K. Islam, M. F. H. Sarker, M. S. Islam, Promoting student-centred blended learning in higher education: A model, *E-Learn. Digit. Media* **19**, 1: 36-54 (2022)
10. A. Windasari, B. Syefrinando, V. Wiliyanti et al., The influence of the blended learning model on students' concept understanding ability viewed from self-confidence, in *AIP Conference Proceedings* (AIP Publishing, 2024), Vol. **3058**, No. 1