THE EFFECTIVENESS OF MICRO VIDEOS IN COMPUTER SOFTWARE LEARNING FOR VOCATIONAL SCHOOL STUDENTS

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ABSTRACT
This study aimed to investigate the effectiveness of micro-video instruction in the learning process of computer software courses among vocational school students. The research sample consisted of 20 students majoring in Arts and Design at a vocational high school. A quantitative research approach was employed, utilizing a pre-test-post-test design to compare and analyze students' academic performance, thereby examining the impact of micro-video instructional interventions. The results indicated that micro-video instruction was highly effective in enhancing students' learning outcomes in vocational school computer software courses. These findings provide empirical evidence for educators and curriculum developers, suggesting that micro-videos should be considered a central component of instructional design, particularly in courses emphasizing technical and operational skills.
Keywords: Micro Video, Vocational High School Students, Computer Software Learning, Educational Informatization

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INTRODUCTION

In the contemporary era, the deep integration of information technology and education has become a pivotal driver of global educational reform. Nations worldwide are actively promoting the digital transformation of education, with micro-videos emerging as a crucial digital teaching resource and pedagogical medium due to their fragmented, flexible, and vivid characteristics. In China, guided by national strategies such as the *Education Informatization 2.0 Action Plan* (2018) and *Education Modernization 2035* (2019), the development and application of micro-video resources have formed a comprehensive system, permeating all levels of education from basic to higher and vocational education, and becoming a key support for innovative teaching models such as MOOCs and flipped classrooms. Against this macro-backdrop, exploring the effective application of micro-videos in specific disciplines and teaching scenarios holds significant practical importance.

Vocational education, as a key arena for cultivating technical and skilled talents, places particular emphasis on students' practical operational abilities. Computer software courses, being a core component of vocational skill training, are directly linked to students' vocational competence and employment competitiveness. However, traditional teaching models often exhibit clear limitations in this field. The abstractness, complexity, and practicality of software knowledge make it difficult for monotonous teacher demonstrations and unified instruction to cater to the diverse learning paces and comprehension levels of students (Ke, 2023; Wang, 2023). This often leads to students' passive acceptance of knowledge, low enthusiasm for learning, and an inability to translate theoretical knowledge into proficient operational skills, thereby affecting the overall teaching effectiveness.

The study was conducted at Zaozhuang School of Technology, a public institution located in Zaozhuang City, Shandong Province that serves students from diverse socioeconomic backgrounds. The computer software courses being studied were *Computer-Aided Design Software Fundamentals* and *Graphic Image Processing*, which aim to equip students with the skills and knowledge necessary for success in the art and design industry.

As an emerging teaching tool, micro-videos demonstrate unique advantages in addressing these challenges. Their "short, concise, and focused" characteristics align perfectly with the cognitive rules of software skill acquisition. Micro-videos can present complex operational steps visually and intuitively, allowing students to pause, replay, and learn at their own pace, effectively overcoming the one-time and fleeting drawbacks of classroom demonstrations (Li, 2022; Tang, 2023). This student-centered, self-paced learning approach is highly consistent with the core ideas of Constructivist Learning Theory (Piaget, Vygotsky), which emphasizes that learners actively construct knowledge meaning within specific contexts. Micro-videos serve as excellent "scaffolding," helping learners gradually achieve independent task completion during this construction process. Furthermore, from the perspective of Multimedia Learning Theory (Mayer, 2009), micro-videos, by simultaneously presenting pictures, text, and sound through dual channels, conform to human cognitive processing mechanisms, thereby promoting deeper knowledge understanding. Cognitive Load Theory (Sweller, 1988) also supports the use of micro-videos, as breaking down complex software knowledge into micro-units helps reduce learners' cognitive load, preventing working memory overload and facilitating the transfer of knowledge to long-term memory.

Nevertheless, simply introducing micro-videos does not automatically lead to optimal teaching outcomes. The existing literature primarily focuses on the broad applicability of micro-videos, but there is a relative lack of in-depth empirical research on *how* they specifically enhance teaching effectiveness in vocational computer software courses and the underlying mechanisms. Previous studies have confirmed that micro-videos can enhance learning interest and operational practice (Xu, 2023; Li, 2023). However, improving final academic performance and skill mastery requires not only high-quality learning resources but also

scientific teaching design and theoretical guidance. For instance, Humanistic Learning Theory (Rogers, Maslow) reminds us that teaching design must center on students, stimulate their intrinsic motivation, and meet their needs for self-realization. The effectiveness of micro-video teaching depends on whether its design and application truly reflect this student-centered principle, transforming students from passive "knowledge recipients" into active "knowledge constructors."

Therefore, to fill this research gap, this study, based on the theoretical foundations (Constructivism, Multimedia Learning, Cognitive Load, Humanism), will construct a mediating mechanism model to investigate the influence of micro-video teaching on students' academic performance and skill mastery in vocational school computer software courses. This study will develop a series of micro-video courses tailored to the "Photoshop" software course and conduct empirical teaching experiments in vocational schools. The aim is to validate the role of micro-videos in enhancing learning interest, improving academic performance, and promoting skill acquisition through quantitative and qualitative data, ultimately providing theoretical support and practical guidance for the deep integration of micro-videos in vocational education and teaching reform.

LITERATURE REVIEWS

The relationship between micro-video teaching and students' academic performance.

The relationship between micro-video teaching and students' academic performance has attracted increasing scholarly attention in recent years, particularly in the field of vocational education where computer software courses require both theoretical understanding and practical skills. Micro-videos, characterized by brevity, clarity, and multimodal presentation, have been identified as an effective instructional tool to reduce cognitive load and facilitate knowledge construction (Mayer, 2001). Unlike traditional teaching approaches that rely heavily on lengthy explanations, micro-videos provide segmented, visualized demonstrations that allow students to grasp key knowledge points more efficiently (Kay, 2012).

In vocational school contexts, where students often struggle with the abstract and complex nature of software learning, micro-videos offer unique advantages. They not only enable flexible and repeated learning outside the classroom but also enhance classroom participation and motivation by presenting content in a vivid and engaging format (Li, 2022; Tang, 2024). Empirical evidence further supports the effectiveness of micro-video instruction. For instance, Liu et al. (2022) developed a micro-video teaching platform based on deep learning and human-computer interaction, which significantly improved students' satisfaction with classroom teaching by nearly 15% and enhanced the compactness of the college classroom by nearly 12%. These improvements in learning experience and engagement are closely associated with better academic outcomes.

Moreover, Guo et al. (2014) demonstrated that shorter, well-produced videos (under 6 minutes) are more engaging and lead to higher retention and problem-solving attempts. Their large-scale study also highlighted that informal, personalized video styles (e.g., Khan-style tablet drawings) foster a stronger sense of connection and engagement compared to traditional lecture formats. Such findings underscore the importance of video design in maximizing learning effectiveness.

Based on the above theoretical and empirical evidence, it can be concluded that micro-video teaching plays a positive role in improving students' learning outcomes, bridging the gap between conceptual knowledge and practical application. Accordingly, the following hypothesis is proposed:

H1: The use of micro video teaching can significantly improve the academic performance and practical application ability of vocational school students in computer software courses.

The relationship between micro-video teaching and students' learning interest.

The relationship between micro-video teaching and students' learning interest has been emphasized in both theoretical and empirical studies. Learning interest is widely recognized as a crucial factor influencing students' engagement, persistence, and overall learning outcomes (Deci & Ryan, 2000). Traditional classroom teaching in vocational schools often struggles to sustain students' attention due to its monotonous delivery and limited interactivity, particularly in abstract and technical subjects such as computer software. Micro-videos, with their concise, visually appealing, and scenario-based presentations, provide an alternative instructional format that can effectively capture learners' attention and stimulate intrinsic motivation (Mayer, 2001; Kay, 2012).

In vocational software courses, micro-videos allow students to observe vivid demonstrations of operational procedures, pause or replay content at will, and connect learning tasks to real-life contexts. Such features not only reduce cognitive barriers but also enhance emotional engagement, thereby fostering sustained interest in learning (Li, 2022; Liu et al., 2022). For instance, the micro-video teaching platform developed by Liu et al. (2022), which incorporates human-computer interaction design, enhances system interactivity and increases students' willingness to actively participate in the learning process. Additionally, Guo et al. (2014) highlighted that personalized video styles with a strong sense of dialogue, such as Khan Academy-style handwritten explanations, significantly improve learners' concentration and engagement, thereby stimulating and sustaining their learning interest.

Based on these findings, it can be concluded that micro-video teaching has a significant positive effect on promoting students' learning interest. Accordingly, the following hypothesis is proposed:

H2: Micro-video teaching can significantly enhance students' interest in learning.

The relationship between micro-video teaching and students' classroom satisfaction.

The relationship between micro-video teaching and students' classroom satisfaction has also been increasingly acknowledged in the field of educational innovation. Classroom satisfaction reflects learners' overall evaluation of teaching methods, content, and learning outcomes, and serves as an important indicator of instructional effectiveness. In traditional teaching contexts, vocational students often express low satisfaction due to limited opportunities for individualized learning, inflexible pacing, and insufficient interaction. Micro-videos, however, provide learners with more autonomy and flexibility, allowing them to control the pace of study, review difficult points, and engage in learning activities more effectively (Mayer, 2001). Empirical evidence from recent studies strongly supports this view. Specifically, in the context of vocational education, the use of micro-videos has been shown to transform the learning experience by serving as a learning aid that enhances retention and practical skills in the classroom, while also allowing students to review and preview knowledge outside of class, effectively addressing diverse learning needs (Li, 2022). This flexibility and ability to support self-paced learning is highly valued by students. Furthermore, the vivid and intuitive presentation of content in micro-videos is highly effective in capturing students' attention. Research by Tang (2023) confirmed that micro-videos can attract students' attention and improve the targeted nature of teaching, while Xu (2023) emphasized that their application helps students quickly enter a learning state and maintain full engagement and proactiveness. This is largely because micro-videos, as a learning medium that integrates "image + text + sound," aligns with the dual-channel principle of cognitive processing, thereby promoting deeper understanding and a more positive learning experience (Mayer, 2009).

Research findings consistently show that students demonstrate higher acceptance of micro-video teaching compared with conventional approaches. For instance, studies reveal that students appreciate the clarity and practicality of micro-videos. Li (2022) reported that students showed no resistance to theoretical knowledge presented via micro-videos and took the

initiative to explore further. Similarly, Li (2023) found that the application of micro-videos made students more accepting of the course content and improved their learning efficiency and inquiry effectiveness. The ability to watch videos at any time and the integration of multimedia elements further enhance satisfaction by aligning with students' diverse needs and learning preferences.

Therefore, it can be concluded that the overall acceptance of micro-video teaching among students is higher than that of traditional teaching, and their satisfaction with the method is relatively high. Accordingly, the following hypothesis is proposed:

H3: The overall acceptance of micro video teaching mode by students is higher than that of traditional teaching mode, and their satisfaction with micro videos is relatively high.

RESEARCH METHODOLOGY

This study employed a quantitative research approach with a single-group pre-test-post-test design to evaluate the effectiveness of micro-videos in vocational high school computer software courses, focusing on their impact on students' learning outcomes and satisfaction.

The participants were 80 second-year students majoring in Art and Design at Zaozhuang School of Technology, Zaozhuang City, Shandong Province, China, from which 20 students were randomly selected as the research sample. Research instruments included self-developed micro-videos, pre-test and post-test assessments of academic performance, and a Likert-scale survey to measure students' satisfaction with the micro-video instruction.

Micro-videos were developed following multimedia learning theory and cognitive load theory, ensuring content was effectively presented through both visual and auditory channels. Each video targeted a single core concept, lasted less than five minutes, and incorporated multimedia elements such as software operation screen recordings, animated demonstrations, voice-over explanations, and key-point annotations. These design features aimed to reduce cognitive load and make complex software operations more intuitive and accessible.

During the intervention, micro-videos were systematically integrated into the course. Students previewed designated videos before class, while in-class instruction was supported by videos alongside group discussions, hands-on practice, and Q&A sessions. After class, students could review the videos as needed to consolidate knowledge. The intervention lasted three months, aligned with the course schedule.

Data were analyzed using descriptive statistics (means and standard deviations) to examine overall performance and satisfaction and paired-sample t-tests were conducted to compare pre-test and post-test scores, assessing whether observed improvements in academic performance were statistically significant.

RESEARCH RESULTS

Respondents' Profiles

The study involved 20 students from the Art and Design program at Zaozhuang School of Technology. Among the respondents, 15 were female (75%) and 5 were male (25%). Their ages ranged from 16 to 18 years, with the majority being 17 years old (14 students, 70%). All participants were enrolled in the second year of the vocational high school program. Regarding their exposure to computer-aided design, 14 students (70%) reported having only basic familiarity, while 6 students (30%) demonstrated comparatively higher levels of experience. This demographic information provides a comprehensive overview of the study sample and helps contextualize the subsequent analysis of the micro-video learning intervention.

Comparison of average scores of mathematics pre- and post-class academic tests using micro-lessons

Table 1 shows the effectiveness of students using micro-videos in their computer software course. The mean score on the pre-course test was 63.20, with a standard deviation of 16.29.

After one semester of using micro-courses, students' academic performance improved significantly, reaching a mean score of 82.40 with a standard deviation of 13.00. Comparing the pre- and post-test scores, a paired-sample t-test showed a score of 7.28, indicating a significant difference between pre- and post-test scores ($p < 0.05$). Overall, post-test scores were significantly higher than pre-test scores, demonstrating the effectiveness of micro-video instruction in the computer software course.

Table 1 Comparison of average scores before and after Micro-lessons study

Items	n	$\bar{X}$	S.D.	t-test	Sig. (2-tailed)
Pre-test	20	63.20	16.29	7.28	.000*
Post-test	20	82.40	13.00		

*p<.05

Student satisfaction evaluation results

Table 2 shows that the average student scores ranged from 4.10 to 4.80, placing them above average. The highest average score was for "The operation is reasonable and easy to learn," at 4.80; the lowest average score was for "Students are willing to watch micro-videos on their own after class to learn," at 4.10. The overall average satisfaction score was 4.53, a high level, indicating a high level of student satisfaction with learning computer software courses through micro-videos.

Table 2 Evaluation results of students' satisfaction with computer software courses using micro-videos

Evaluation Items		$\bar{X}$	S.D.	Result
1) Content				
1.1	The learning content is adapted to the prescribed learning time.	4.45	0.67	Satisfied
1.2	The learning content and topics are interesting.	4.65	0.48	Very Satisfied
1.3	The learning content covers the main learning objectives.	4.45	0.74	Satisfied
1.4	Learning content is appropriate to students' grade levels.	4.65	0.48	Very Satisfied
1.5	The learning content helps students better understand the software tools and operating procedures during practice.	4.45	0.67	Satisfied
1.6	The content of the exercises is related to the learning content.	4.70	0.46	Very Satisfied
1.7	The subjects are better suited to learning through video demonstrations.	4.35	0.73	Satisfied
1.8	The class content is easier for students to grasp the knowledge points than traditional teaching content.	4.55	0.67	Very Satisfied
2) Interest and Engagement				
2.1	The class content is more interesting than traditional teaching content.	4.55	0.59	Very Satisfied
2.2	Students are more willing to participate in classroom activities during class.	4.50	0.67	Very Satisfied
2.3	Students are willing to watch micro-videos on their own after class to learn.	4.10	0.92	Satisfied
3) Instructional Design				
3.1	The operation is reasonable and easy to learn.	4.80	0.51	Very Satisfied
3.2	The font and size of the teaching content are reasonably and beautifully chosen.	4.60	0.49	Very Satisfied

Evaluation Items	$\bar{X}$	S.D.	Result
3.3 The sound is clear and loud.	4.65	0.48	Very Satisfied
3.4 There are sufficient interaction and timely feedback.	4.50	0.67	Very Satisfied
3.5 Reasonable color selection.	4.75	0.43	Very Satisfied
3.6 Attractive to students.	4.65	0.57	Very Satisfied
3.7 It facilitates students' independent learning and makes classroom learning more flexible.	4.60	0.49	Very Satisfied
4) Micro-video teaching			
4.1 The micro-video learning content is easy to understand.	4.35	0.79	Satisfied
4.2 The content of the micro-video is interesting.	4.25	0.76	Satisfied
4.3 Micro-video teaching is highly interactive.	4.25	0.94	Satisfied
4.4 The length of the micro-video is appropriate.	4.65	0.72	Very Satisfied
4.5 Willing to learn other subjects through videos.	4.40	0.71	Satisfied
5) Overall evaluation			
5.1 It can help students better understand the learning content.	4.50	0.59	Very Satisfied
5.2 The exam difficulty is appropriate.	4.60	0.58	Very Satisfied
5.3 The absorption of knowledge points is more effective.	4.70	0.46	Very Satisfied
Total	**4.53**	**0.63**	**Very Satisfied**

DISCUSSION & CONCLUSION

The results of this study demonstrate that the integration of micro-videos into computer software courses for vocational school students yields significant positive outcomes in both academic performance and student satisfaction.

The comparison of pre-test and post-test scores revealed a statistically significant improvement in students' academic achievement after exposure to micro-video instruction. The mean score increased from 63.20 to 82.40, with a highly significant t-test value ($p < 0.05$), indicating that micro-videos effectively enhanced students' understanding and operational skills in computer software. This aligns with the principles of multimedia learning and cognitive load theory, which suggest that visual and auditory information delivery—coupled with the ability to pause, replay, and learn at one's own pace—can facilitate deeper cognitive processing and knowledge retention.

Furthermore, the satisfaction survey results indicated a high level of student acceptance and enthusiasm for micro-video-assisted learning. The overall satisfaction score of 4.53 (on a 5-point scale) reflects students' positive perception of the micro-video format. Items related to operational ease, content adaptability, and instructional design received particularly high ratings, suggesting that micro-videos are not only educationally effective but also engaging and user-friendly. However, the slightly lower score on willingness to watch micro-videos independently after class (4.10) suggests that while students value in-class use, further strategies may be needed to encourage self-directed learning outside the classroom.

These findings support the notion that micro-videos are a powerful tool for vocational education, especially in skill-based subjects like computer software. They help bridge the gap between theoretical knowledge and practical application, provide flexible learning opportunities, and cater to diverse learning paces and styles. Moreover, the positive reception from students underscores the potential of micro-videos to increase motivation and classroom participation.

In conclusion, this study confirms that micro-video teaching can significantly improve both learning outcomes and student engagement in computer software courses at the vocational school level. It is recommended that educators and curriculum developers incorporate micro-videos as a core component of instructional design, particularly in technical and operational

subjects. Future research could explore the long-term retention of skills learned via micro-videos, as well as their application in other vocational disciplines.

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