



# The Effectiveness of the Blended Learning Metho in Computer-Aided Ui Design Course

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## Abstract

**Background and Aim:** The study discusses how blended learning and teaching intervention based on the Superstar learning system would have an impact on students' academic performance in design practice courses. The main objective was to determine the effectiveness of a blended learning approach based on the Superstar learning system in improving student academic performance in a computer-assisted UI design course and to determine if it improves student academic performance.

**Materials and Methods:** In this study, 64 undergraduate students studying at the university majoring in digital media art participated in the study. Participants were divided into two groups—the control group and the treatment group. The control group adopted traditional in-class lectures as the teaching method, while the treatment group adopted the hybrid teaching method based on the Superstar learning system. After 8 weeks of study, two groups of students assessed design works based on the four aspects, which are conceptual knowledge, creativity of thinking, aesthetics, and attendance to find out the effectiveness of the treatment.

**Results:** The results revealed that blended learning through the Superstar learning system has been found to significantly enhance students' performances in all four areas studied, which are conceptual knowledge, creativity of thinking, aesthetics, and attendance. Compared to the traditional way, the blended learning method can provide students with more flexible learning methods and environments, which help students earn higher scores in the courses.

**Conclusion:** These research results support the existing studies, indicating that the blended learning method can improve students' academic performances in Computer-aided UI design courses to a certain extent.

**Keywords:** College Student; Blended Learning; Teaching Design; Teaching Intervention; Design Major

## Introduction

In today's world, with the development and popularization of Internet technology, although the traditional offline face-to-face classroom learning method still dominates teaching in colleges and universities, with the combination and innovation of information technology and education, new forms of teaching and learning reforms such as distance education, online learning, or e-learning are gradually proposed, and blended learning is beginning to gradually receive attention in the field of education (Wu and Liu, 2013). At the same time, since the year 2020, the world has seen the emergence of blended learning. Meanwhile, since 2020, almost all countries and regions worldwide have been affected by the COVID-19 pandemic, which has affected 94% of learners in more than 200 countries, with education types ranging from preschool to higher education, and more than 1.58 billion students have been affected and are unable to continue their studies (United Nations, 2020). According to NBSC (2020), China has the largest number of tertiary education students in the world, who come from 31 provinces, cities, and municipalities and have to rely on various modes of transportation to travel through different administrative regions to reach their colleges and universities. Blended learning is a new style of education that can be defined as blended learning in several ways, such as combining web-based technologies, methods such as instructional models, and instructional technologies with real-world work tasks (Driscoll, 2002). Blended learning is a fusion of face-to-face and online learning experiences, and the basic principle of blended learning is that face-to-face verbal communication and online written communication are optimally integrated so that the strengths of each are blended into a unique learning experience that is consistent with the environment and the intended educational purpose (Garrison & Vaughan, 2008).

Given the characteristics of the blended learning approach, its innovativeness lies in its ability to electronically assist the traditional inherent face-to-face offline learning methods. In the past, for students to learn, teachers emphasized the need for students to make sure that they listened attentively





during class in the classroom, and lectures were often delivered using one-sided knowledge infusion, while students' learning outcomes were monitored and verified after class by assigning homework (Tucker, 2001). However, with the development of information technology, learning methods began to gradually take on an electronic character. Through the combination of traditional learning methods and computer technology, it can help students realize learning anytime and anywhere, without time and space constraints, with good flexibility. Innovative blended learning is more popular among students than the dullness and excessive constraints brought by traditional face-to-face offline learning (Gowda and Suma, 2017).

research on blended learning deepens, practitioners in the field of education realize that the traditional face-to-face learning approach has its inherent value of existence. This type of learning allows for more intuitive communication between students and teachers, and teachers can more realistically observe students' facial and physical expressions, as well as emotional embodiments, in the classroom. However, the closed classroom and one-way indoctrination teaching method, result in students in the course of study having difficulty concentrating for a long time, so students feel bored and constrained. Therefore, computer technology-assisted blended learning in the inheritance of the advantages of face-to-face learning based on the addition of online systems, can provide students with more diverse and rich learning resources, learning space, and discussion and communication platform at any time and any place. These new features can bring students a new experience. Although blended learning theory has been proposed and applied in educational practice by scholars and experts, there are fewer cases in the field of art majors, especially in visual design-related courses. Therefore, this study aims to investigate the effectiveness of blended learning methods in computer-aided user interface design courses and provide new ideas for other teachers to develop teaching plans in related professional courses.

## Objectives

1. To determine the effectiveness of the blended learning method using the Superstar learning system-based learning in improving the academic performance of the students in computer-aided UI design courses.
2. To examine the student attendance towards the adoption of the Superstar learning system as a learning tool for the students in computer-aided UI design courses.

## Literature review

In the literature review, the researcher provided a comprehensive review of the literature in 2 key research areas, which are Blended Learning Theory and Instructional Design Theory. One of the blended learning theories contains 3 areas, which are the Theory of Constructivism, the Theory of Activity, the Theory of Autonomous Learning, and the Technology Acceptance Model. The second part of this chapter provides specific information about the population. Part III explores the relationship between population and research on the above topics. The fourth section includes the theoretical framework and previous literature, and the final section reviews the conceptual and research frameworks. The goal of this research is to provide an application and overview of relevant theories, concepts, and research findings related to these topics, categorized into separate subsections.

### *Blended learning theory*

Blended learning is an important topic that has been the subject of a great deal of research in the field of education in recent years. Research has explored its impact on motivation and student achievement in a variety of subjects. Empirical evidence supports the view that blended learning can improve educational outcomes. The research covers aspects of a blended learning approach, incorporating the Superstar learning system as an instructional aid to develop a quantifiable instructional design and intervention. The purpose of this study was to design and establish a blended learning design intervention program with practical utility for a design practice course.

Several research elements have clarified the definition of blended learning theory. For example, Garrison and Kanuka (2004) defined blended learning as being a combination of classroom face-to-face learning experiences and online learning experiences. Among others, Garrison and Vaughan (2008) argued that blended learning is a combination of face-to-face and online learning experiences, with the underlying principle that face-to-face verbal communication and online written communication are optimally integrated so that each one's strengths are blended into a unique learning experience that is aligned with the environment and the intended educational purpose. They proposed that this learning approach draws on the strengths of both offline face-to-face and online system learning modes to reorganize the student learning process and related resources to achieve the goal of improving student



learning and instructor teaching effectiveness. Bonk and Graham (2012) in *The Handbook of Blended Learning: Global Perspectives, Local Designs*, published in 2006, defined blended learning as a combination of face-to-face instruction and computer-assisted online learning. Singh and Reed (2001), on the other hand, argue that Blended learning is about optimizing the achievement of learning goals by using the right learning technology to match the right individual learning styles to deliver the right skills to the right people at the right time.

Besides, Sharples and Beale (2003) argued that there is a wide variety of devices and platforms that have access to the Internet, not only computers but also portable devices such as cell phones and tablets, which have similar functionality to computers and can be used to meet the user's needs. Therefore, in this study, blended learning is defined as a learning and teaching experience that combines face-to-face learning in the classroom and online system learning. Therefore, the key elements of blended learning in this study are both face-to-face and online learning and teaching.

#### *Theory of Constructivism*

Constructivism originated in pedagogy as a theory of learning proposed to improve teaching and was first proposed by the Swiss psychologist Piaget in the course of studying the characteristics of children's cognitive development.

As studied by Piaget (1964), the main purpose of the theory is to understand how various activities in the developmental process can trigger children's self-directed learning and how the teacher can appropriately play the role of a supporter in the learning process. Piaget (1970) put forward the developmental conception of the interaction of internal and external factors, i.e., psychological development is a result of the interaction between the subject and the object. He believed that human learning behavior can only occur if the learner assimilates external stimuli into the original cognitive structure. Kohlberg and Hersh (1977), based on Piaget's theory, emphasized that moral judgments are commonly inconsistent with their behaviors, but the higher the developmental level of an individual's moral judgment ability, the higher the degree of consistency between moral judgments and behaviors. Thus, Kohlberg argues that the key to moral development is the development of students' moral judgment.

Sternberg (1985) proposed the importance of cognitive processes in problem-solving after a detailed analysis of the Theory of constructivism, and he argued that intelligence consists of three components-components, experiences, and contexts-which represent different aspects of intellectual operations. His theory of intelligence is also known as the triarchic theory of intelligence.

Bruner (1964) viewed the cognitive process of a person as the process of actively constituting his knowledge by linking newly learned information to the mental framework or model of reality developed by previous learning. A person's knowledge of the world is based on a model of reality that he conceives. Such models are first drawn from the individual's culture and adapted to the individual's varied usage.

Tam (2000) theorized that learning is not the teacher's fill-in indoctrination and students' mechanical memorization, but rather, it is carried out by the learners in a certain socio-cultural context, with the help of the teacher or peers, and by using the necessary information through the way of meaning construction. Qiu (2019) also argued that the constructivist learning theory believes that context, collaboration, conversation, and meaning construction are the four learning environment elements. Meaning construction is the goal of the whole learning process, and the meaning to be constructed is the nature of things, laws, and the intrinsic connection between things.

#### *Theory of Activity*

Kaptelinin & Nardi (1997) viewed Activity Theory as a philosophical framework for the study of the different forms of human practice as a developmental process, with the basic unit being the activity. The activity theory system contains three core components, namely subject, object, and community, and three secondary components, namely tools, rules, and division of labor.

Kaptelinin and Nardi (2006) believed that activity refers to the basic form of human survival and development, the process of communication and transformation of human beings with the objective things around them, and the process of human beings accomplishing the purpose of completing the knowledge and needs of the objective environment. In the process of teaching and learning, learning is the labor of the learner, and in the learning process, the learner completes the learning activity which is the acquisition of the need for awareness and the change of the external environment.

According to Lawrence and Valsiner (2003), internalization and externalization refer to two aspects of the impact of activities on people, internalization is the internalization of knowledge, skills, theories, etc. from the activity into the human mind and is a change in the learner's understanding of the external world. Externalization, on the other hand, is a change in the learner's behavior as a result of internalization and a change in the way the learner behaves. In Activity Theory, activities are a process of shifting from internalization to externalization, and from externalization to influence internalization.



Jonassen and Murphy (1999) argued that the application of activity theory also requires the intervention of tools, which are the material basis of activity theory. There are tools for application that are based on human culture, such as symbols and language. There are also physical activity tools, such as machines and natural environments. In the field of modern education, based on the Internet technology for learning, the network teaching platform has also become a basic tool for the application and research of activity theory, and the use of appropriate network platforms will become one of the characteristics of education in the new era, guided by activity theory.

Thorpe (2002) argued for the use of activity as the starting point and core of practice research, which in turn explains the developmental processes of the human psyche. The main components in the activity system are subject, object, and community. In the actual teaching and learning activities the subject is the individual student or group of students, which is the implementer of the instructional design. The object is the teaching goal, and accurate goal analysis is a prerequisite for the successful implementation of teaching. The community refers to other participants who work together with learners to complete the learning process, and in the learning process, the community can provide appropriate help to make the teaching activities complete and successful. Lim and Chai (2004) also proposed that blended learning or teaching mode is a process of teaching activities, the main core of the model is to follow the physical and mental development of the students' laws and the corresponding educational theory base, design a reasonable teaching activity. The main core of this model is to follow the students' physical and mental development and the corresponding educational theory to design reasonable teaching activities. Under the guidance of activity theory, blended teaching can give full play to the subjectivity of students, so that students can actively study and research, thus helping students to become the masters of learning activities from the consciousness.

#### *Theory of Autonomous Learning*

The theory of self-directed learning has been explicitly proposed dating back to the 1970s. The formulation of the theory was mainly influenced by 2 factors, namely the influence of humanistic psychology and the shift in the objects and methods of educational research in the disciplines. Rotter (1954) also argued that a person's successful expectations depend on one's experience in a particular past environment or intuition about the characteristics of the identified task, emphasizing the duality of instructional goals, i.e., affective developmental goals and cognitive developmental goals.

Zimmerman (1990) argued that students who engage in self-directed learning are more able to independently select, organize, and create environments that optimize learning, that self-directed learning is not learning in absolute isolation, that the learning process does not exclude the help of others, and that self-directed learners can seek help from their families, classmates, teachers, or other more experienced people when faced with tasks they are unable to solve on their own. Blended Learning. Blended learning advocates online independent pre-study before class, collaborative discussion in class, and self-summarization after class, all of which are in line with the ability of independent learning.

Román et al. (2016) suggested that self-directed learning is categorized into 3 characteristics: self-oriented learning, self-reliant learning, and self-disciplined learning. In the process of learning, students are the leaders in the learning process and can independently control their time, energy, and behavior. At the same time, students can also independently choose the content of learning, check the progress of learning, set the chapter of learning control the pace of learning, etc., through which they can continuously deepen the content of learning by themselves.

Lambros (2004) proposed a student-centered, problem-based teaching methodology for acquiring new knowledge at the point where teacher-based instruction allows students to fully participate in the construction of knowledge, i.e., the PBL approach to learning. The PBL methodology and the social constructivist theory suggest that learning is a social and cooperative process activity.

#### *Instructional design*

Instructional design is a strategic and behavioral intervention in the learning process of students. Miller and Butler (1952) argued that human behavior is acquired through learning and that understanding human behavior requires knowledge of the principles of learning. Bruner (1960) argued that it is the task of the educator to transform knowledge into a form that is adapted to the developing student. The sequence of characterization system development can be used as a model for instructional design.

Niegemann et al. (2004) argued that instructional design describes the systematic planning, process, and evaluation of learning environments and materials. planning, process, and assessment. The aim is to create environmental conditions suitable for enhancing skills. Instruction here means any systematic arrangement of environmental conditions, even using multiple media, suitable for enhancing skills.





Hattie et al. (2015) argued that, in addition to the influence of students themselves, teachers are the biggest external factor influencing student learning. Teachers can improve student learning by improving their own teaching ability and teaching methodology, which can be applied flexibly to the course specialty category, specific teaching context, and specific teaching content.

Merrill et al. (1996) considered instructional designers a practice of systematically designing, developing, and delivering instructional materials and experiences consistently and reliably to achieve efficient, effective, engaging, compelling, and inspiring knowledge acquisition. Cenker (2006) stated that learning interventions based on actual teaching and learning environments as all the behaviors of a teacher to help a learner to develop specific attitudes, skills, and knowledge in all their behaviors.

Bruton (2011) argued that an instructional behavior is a behavior or measure that follows the learning process of the learner. In instructional design, teachers are instructional designers and managers as well as evaluators of student learning, and teachers are responsible for the pedagogical tasks of motivating, sustaining, and enhancing students' learning activities. Teachers should view learners' learning as a proactive process, value the role of learners' intrinsic motivation and intrinsic reinforcement brought about by the learning activity itself, and emphasize creativity in learning during the learning process.

### Conceptual Framework

In this section, the researchers aim to provide an overview of the variables and their interrelationships that affect student performance. The research examines the impact of a blended learning approach based on a computer-assisted UI design course compared to a traditional offline face-to-face learning approach on student performance and class attendance. The research examines the impact of a blended learning approach on student achievement and attendance in a computer-aided UI design course compared to a traditional offline face-to-face learning approach.

A blended learning approach is essential for improving student performance in a course. The current study used a quasi-experiment to assess the impact of the blended learning approach on students' performance components in four dimensions: Conceptual knowledge, Creativity of Thinking, Aesthetics, and Student Attendance.

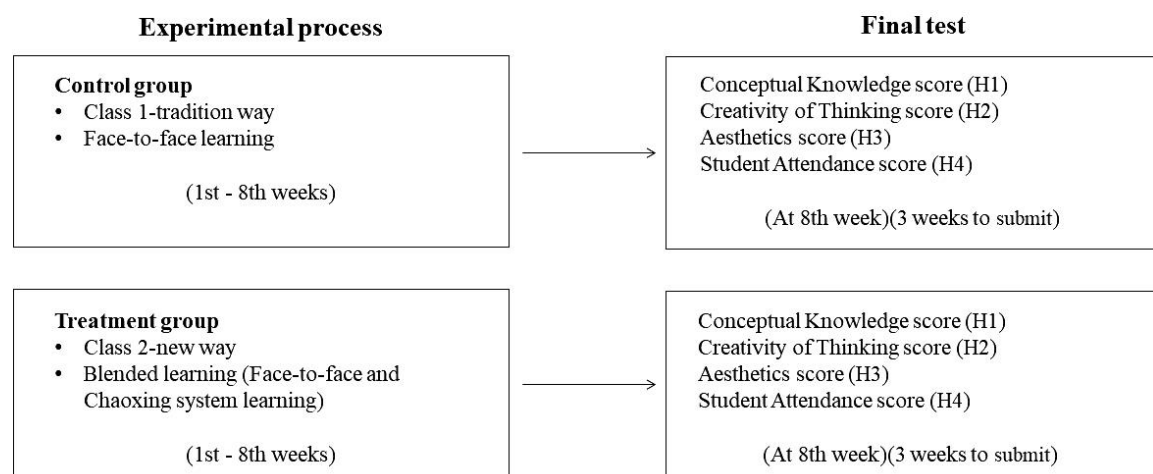


Figure 1 The framework of the effectiveness of blended learning in Computer-aided UI design course

### Hypotheses

Based on the literature review, and the conceptual framework, the hypotheses have been developed as follows.

H<sub>a1</sub>: There is a difference between the control group and the treatment group in the Conceptual Knowledge score.

H<sub>a2</sub>: There is a difference between the control group and the treatment group in the Creativity of Thinking score.



H<sub>a3</sub>: There is a difference between the control group and the treatment group in the Aesthetics score.

H<sub>a4</sub>: There is a difference between the control group and the treatment group in Student Attendance scores.

## Methodology

In this study, a quasi-experiment instructional intervention design was used to divide the study participants into two groups. The first group, which was the control group received traditional face-to-face teaching, while the second group—the experimental group received a blended learning approach based on the Super Star Learning System. Quantitative data analysis was used to assess the effects of the blended learning approach and instructional intervention on students' academic performance.

The focus of this research is based on computer-aided UI design courses, and a complete teaching intervention program is designed around the course outline and teaching tasks. The sample group of the research was purposively selected from undergraduate students at a university studying the interactive art design of digital media art.

This study involved 64 students in the Interactive Art and Design stream of the Digital Media Arts program at the university in Shanxi Province, China. The skills to measure during the learning processes for both groups were Conceptual knowledge, Creativity of thinking, Aesthetics, and Student Attendance.

Since the research aimed to measure the students' skills, the research instrument was a teacher-made assessment according to the lesson plan and the lesson objectives. Student achievements in design work were rated by three teachers according to the rubric provided.

The instructional content was designed to maintain consistency in student learning content, consistency in learning time, and consistency in coursework and design requirements across the 2 groups.

The control group adopts the traditional offline face-to-face learning method, in which the class is held in the classroom, and the teacher accesses the computer through the multimedia equipment and uses the projector to make a projection screen demonstration to complete the teaching task.

The treatment group adopts the traditional offline face-to-face teaching and online electronic system mixed teaching methods, based on the traditional teaching methods, teachers and students can access the Chaoxing system through the wireless network, and students can watch the teaching content through the projector in the classroom, but also through their computers in the online classroom link in the Chaoxing system to watch the teacher's desktop demonstration. The students could view the teaching content through the projector in the classroom and also watch the teacher's computer desktop presentation through their computers via the online classroom link in the Chaoxing system.

The group course was taught from the first week of the experiment to the end of the eighth week. The experiment was carried out to the 8th week (the last week), at the same time, the 2 groups were assigned the same final end-of-course design assignments, which were required to be completed and submitted by the 2 groups of students in the same specified time, the completion time was within 3 weeks after the end of the course, and the grades were counted and tested after the students submitted their works.

The collected data were subjected to statistical analysis, including t-tests to determine any differences and relationships in learning outcomes between the group that underwent the blended learning and the control group. The hypotheses testing focused on variables including Conceptual knowledge, Creativity of thinking, Aesthetics, and Student Attendance. In addition, the demographic information of the samples was also reported in the form of frequencies and percentages.

In summary, the research methodology provided a practicable instructional intervention to examine the impact of blended learning on student achievement in a design-based practicum course. The process integrated ethical considerations, validity and reliability, and appropriate statistical analysis to ensure a complete research process.

## Results

This report provides a comprehensive analysis of the study's findings. It begins with the interpretation of demographic information, followed by detailed inferential statistics and hypothesis



testing. The focus is on whether blended learning approaches compared to traditional learning approaches have an impact on student achievement. These components articulate the analytical methods used to derive important insights from the dataset and clearly explain the quantitative attributes being studied. Together, these components form the basis for a comprehensive analysis of the research findings.

### Demographic Information

Detailed demographics of the treatment group and control group elucidated the gender distribution and corresponding percentages. Of the 64 participants, 27 were male (42%) and 37 were female (58%). This male-female gender ratio coincides to a certain extent with the current gender distribution pattern of students in China who are more female than male in the field of art majors.

### Inferential Statistics: Hypothesis Testing

In the present study, hypothesis testing was important as the researchers tried to measure the role and impact of the blended learning approach and to assess and analyze the student performance in a computer-aided UI design course for both the control and treatment groups.

### Hypothesis Testing

In this subsection, the aim is to assess the hypotheses of the four dimensions that make up student achievement and test them using independent samples t-tests. Hypotheses Ha1 through Ha4 were examined to discover the differences in achievement between blended learning and traditional learning styles based on a computer-assisted UI design course.

Table 1 Independent Samples T-Test

		Statistic	df	p	Mean difference	SE difference
Conceptual Knowledge	t-stat	-3.132	62	.003	-6.51	-2.0789
Creativity of Thinking	t-stat	-2.539	62	.014	-5.68	2.2362
Aesthetics	t-stat	-2.152	62	.035	-5.28	2.4525
Student Attendance	t-Stat	-3.314	62	.002	-4.69	1.4140

After testing and analyzing the data, the t-test reported significant mean differences in all the relevant variables that constitute the performance in the computer-aided UI design course.

Conceptual knowledge, Creativity of thinking, Aesthetics, and Student Attendance showed significant differences indicating that the blended learning approach has a significant impact on student achievement. The subsequent summary in Table 1 confirms the rejection of the null hypothesis and emphasizes the statistically significant impact of the blended learning approach on student achievement.

Table 2 Group Descriptive

	Group	N	Mean	Median	SD	SE
Conceptual Knowledge	Control	32	75.47	74.17	8.89	1.57
	Treatment	32	81.98	80.00	7.70	1.36
Creativity of Thinking	Control	32	73.85	72.50	9.43	1.66
	Treatment	32	79.53	80.42	8.44	1.49



	Group	N	Mean	Median	SD	SE
Aesthetics	Control	32	76.53	75.56	11.10	1.96
	Treatment	32	81.81	82.22	8.32	1.47
Student Attendance	Control	32	94.69	100.00	7.61	1.37
	Treatment	32	99.38	100.00	2.46	0.43

The data in Table 2 shows that the treatment group outperformed the control group in Conceptual Knowledge, Creativity of Thinking, Aesthetics, and Student Attendance. These findings further support that the blended learning approach can effectively improve students' academic performance and class attendance and has certain advantages over the traditional offline face-to-face approach.

In summary, the results of the data analysis represent a detailed exploration of the analytical framework of the study, including demographic and hypothesis testing statistics. The findings from the data analysis provide a foundation for a comprehensive interpretation of the study's results and contribute to a deeper understanding of how higher education can innovate and explore pedagogy in design practice professional programs.

## Conclusion

In conclusion, the existing research content provides convincing evidence that the integration of a blended learning approach in a design practice professional course significantly affects and improves students' academic performance and attendance in the course. The findings highlight the transformation and potential of blended learning approaches to traditional face-to-face learning approaches, revealing the role of blended learning approaches in reforming educational delivery methods and improving student performance and perceptions of course importance. Blended learning based on online learning systems can capture learners' attention and add a certain freshness and fun to the mechanical and boring learning process due to its flexible learning mode and learning environment and more convenient access to information and resources. As a result, students who study blended learning have a stronger awareness of the importance of the course than those who study traditional learning and therefore have a higher attendance and retention rate in the classroom.

In addition, through the teaching process, it was found that students who studied in a blended learning approach communicated more frequently with their teachers about their design work, asked more extended questions outside the classroom, and demonstrated a higher level of active learning during the teaching process, which had a significant positive impact on student achievement. These phenomena suggest that a blended learning approach to course design is a more effective strategy for instructional practice, and this study can serve as a reference for frontline teachers and experts in course design development.

Therefore, further exploration and implementation of blended learning in the field of education is necessary. Future research should explore the underlying mechanisms of how blended learning affects students' cognitive processes of course content, individual differences, and the principles of optimal design for specialized courses with different attributes. As a result, we can unlock more potential of the blended learning theory at the Division to provide students with more engaging and effective pedagogical approaches to education.

Table 3 Data Summarization

	Group	N	Mean	Median	SD	SE
Conceptual Knowledge	Control	32	75.47	74.17	8.89	1.57





		Group	N	Mean	Median	SD	SE
Creativity of Thinking		Treatment	32	81.98	80.00	7.70	1.36
		Control	32	73.85	72.50	9.43	1.66
		Treatment	32	79.53	80.42	8.44	1.49
Aesthetics		Control	32	76.53	75.56	11.10	1.96
		Treatment	32	81.81	82.22	8.32	1.47
Student Attendance		Control	32	94.69	100.00	7.61	1.37
		Treatment	32	99.38	100.00	2.46	0.43
Total Score		Control	32	76.97	75.33	9.08	1.61
		Treatment	32	82.69	83.83	7.18	1.27

## Discussion

The purpose of this study was to assess the impact of blended learning on student achievement in a computer-assisted UI design course. The study analyzed the four key performances—Conceptual Knowledge, Creativity of Thinking, Aesthetics, and Student Attendance, and revealed the differences in these performances between the blended learning approach and the traditional offline face-to-face learning approach.

After the teaching practice of the computer-aided UI design course, it was found that the academic performance of the students in the treatment group who used the blended learning approach was higher than that of the students in the control group who used the traditional learning approach. Blended learning can effectively improve students' academic performance. This may be due to the following two reasons. On the one hand, blended learning is a new product of the development of modernization of education, and the use of computer technology as a classroom aid provides new ideas for classroom teaching. The digital transformation of traditional classroom teaching embodies the characteristics of clear positioning, vivid form, and flexibility, and realizes the combination of scientific, informative, interesting, and practical. On the other hand, the online learning system as an aid, can help students to provide rich teaching resources, specifically including teaching information, design cases, tutorial links, and so on. Moreover, students can communicate with teachers promptly, and students and students can also discuss freely with each other, with a great degree of learning freedom. The flexible and changeable learning style and learning environment of blended learning fit the characteristics of design practice courses (Collins and Olson, 2014). As a result, the final design assignment played a significant role in improving the four aspects of students' knowledge concepts, creativity, aesthetics, and class attendance. In conclusion, through this study, comparing blended learning with traditional learning styles and combining students' information feedback, the advantageous features of blended learning styles were seen, and it was emphasized that students need to have a certain degree of freedom during the learning process and that the flexible and varied learning styles, learning environments, and rich course resources have made students show a higher level of interest in blended learning. The blended learning approach enables students not only to have a new learning experience that is different from the previous one but also to get rid of the time and space constraints and to access course-related learning content anytime and anywhere, thus stimulating enthusiasm for learning.

After blended learning teaching has improved students' academic performance and enthusiasm for learning the relevant courses. It stimulates interest, promotes communication and interaction



between students and teachers, students and students, and deepens students' understanding of professional knowledge and practical operation. For design majors, such a learning state helps to improve their design aesthetics and the precipitation of creative thinking (Warner and Gemmill, 2011). At the same time, it also deepens teachers' perception of students' learning levels, helps them differentiate their counseling of students, and reinforces the positive feedback of blended learning on instructional design. This supports educators in related professional fields. It provides students with a more flexible, interesting, and practical learning experience (Saltan, 2017).

In Chinese university education, blended learning is based on the model of "Internet+Education", which can get rid of the limitations of time and space and allow students to learn efficiently and conveniently. It is a change to the traditional teaching method and greatly enriches the modern teaching mode. Studying the development and innovation of the teaching methods of the courses can contribute to the quality of blended learning and the development of educational patterns in related professional fields.

## Recommendations

After years of practice and development, in the actual teaching process, the research for blended learning has experienced changes from what to blend, to how to blend, to how to improve the quality of blending. With the advent of the information age, combined with the concept of high-quality development of education, the quality improvement of blended learning has become a problem that needs to be considered and solved by each university.

### 1. Recommendation for implication

Based on the research results, blended learning is only one way, and the instructional design of the course is one of the important parts of the preliminary stage. Teachers should improve their knowledge, teaching ability, and teaching methods, combined with the professional attributes of the course, into a specific teaching context and teaching content, and flexibly apply it to improve students' learning effects. Blended learning is a new way of teaching, so teachers must be proficient in the operation of the online system before teaching. This is a basic skill that teachers should have in the new era. Schools should include an introduction to the science and operating procedures of the teaching system in student enrollment training to help students build a software foundation for blended learning in advance. Schools should encourage and train teachers to use blended learning in their daily teaching and conduct related energy-saving competitions in teaching design. This will help broaden teachers' horizons and improve their teaching practice.

### 2. Recommendations for further research

Limited by my academic level and external resources, the exploration of blended learning in this study has some shortcomings, and further refinement of exploration and experimentation is needed at a later stage. The schools in this study cannot represent the actual situation of universities in all regions. The impact of blended learning in design professional education needs to be verified in different schools in more regions to make the experimental results more convincing.

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