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# THE INFLUENCE OF TEACHERS' DIGITAL LITERACY ON STUDENTS' BLENDED LEARNING

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**ABSTRACT-** With the rapid development of information technology, a single way of learning cannot meet the learning needs of students, blended learning came into being. Digital education has been placed in an increasingly prominent position. The cultivation and improvement of teachers' digital literacy should keep pace with the times, adapt to the needs of the development of the times, and improve the effectiveness of blended learning. This study aims to explore the framework of influencing students' blended learning, examine the current situation of influencing students' blended learning, and then explore the relationship between various factors influencing blended learning. The research question of this article is the impact of teachers' digital literacy, policy support and students' self-perception on blended learning. First, this paper will understand the current blended learning situation through a literature review and then conduct questionnaires, interviews, and research using reasonable assumptions. This article will further analyse the potential influencing factors of blended learning, including teachers' digital literacy, policy support and students' perceptions, and provide preliminary basic research for future investigations.

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## INTRODUCTION

Given the main problems in classroom teaching in traditional offline learning, scholars have analysed the issues from multiple dimensions, including curriculum construction, teaching quality evaluation, teaching concepts, etc. The significant aspect can be summarised as two points:

First, the traditional teaching mode centred on "textbook", "teacher", and "classroom" still occupy the mainstream. This model is also called the teacher-centred teaching model, and its essence is that teachers teach teaching materials in class to achieve the purpose of imparting knowledge from books. In this mode, the teaching content is mainly textbook knowledge, the information is limited, the knowledge expansion ability is weak, the frontier development trend and frontier results are few, the teaching content is not closely related to the practice development, and the in-depth mining, analysis, reasoning, and deduction of knowledge are also less, so the teaching content is relatively simple. Teachers prioritise teaching and adopt the "filling the classroom" method in this teaching mode. Students passively accept the information teachers deliver, and there is little interaction between teachers and students. Due to the lack of interaction, teachers' teaching passion is further dissipated, and teachers need more motivation to make reasonable courseware, resulting in simple and rigid courseware design and low attention. Teachers' teaching methods and simple courseware, in turn, further cause students to lose attention to the teaching content and interest in the course. From the instructional design perspective, the knowledge focus teachers' design is based on the syllabus and knowledge system. However, the needs of students are not fully considered, and students' reactions are not paid attention to, so the classroom atmosphere is rather dull. There is no discussion and interaction.

In addition, from the analysis of teaching effect, teaching materials and textbook knowledge are at the center of the exam, teachers write questions, and students' answers do not directly relate to the

student's knowledge, understanding, application, and critical thinking ability assessment. Therefore, in the traditional "teacher-centred" teaching mode, administrators and teachers often take "teaching" as the goal. When evaluating teachers' teaching workload, they take teachers' class time as the standard to assess teachers' work, and there is no special requirement for teaching effect. At the same time, when the school speciality is set up, it is based on what the teacher knows to open any speciality and what the teacher wants to teach. Another primary reason is that "student-centered" has not sunk in. Ministry of Education of China has put forward the quality evaluation concepts of "student-centred", "result-oriented", and "continuous improvement for the purpose" for undergraduate teaching audit and evaluation. The evaluation experts pay the most attention to the teaching and learning effects. However, the concept of "student-centred" has not penetrated the minds of the school staff(Zhao et al., 2017). As for the problems in offline classrooms, this situation is gradually changing with the development of The Times, the change in technology and the emergence of E-learning and Blended learning.

The rapid development of information technology promotes the emergence of E-learning. E-learning is generally translated as electronic, digital, or network learning, broadly referring to teaching and learning behaviour in the information technology environment. However, in practical applications, digital learning based on multimedia materials is also included, and it is emphasised that digital content should be combined with network resources in E-Learning (Yan Ying, 2008). The concept of E-Learning was formally put forward around 1998. As Henry expresses in his 2001 article, some 18 months ago, the term “e-learning” was not coined, but now there are millions of e-learning courses online. E-learning is widely accepted mainly because of the commercial development of Learning Management Systems (LMS/ Learning Management Systems). Even better, Internet-connected laptops that can send e-mail are now entering classrooms. With E-Learning, teachers can send assignments and study materials to students' computers without using Blackboard. With E-Leaming, teachers can send homework and study materials to students' computers without using a blackboard. E-Learing In the early stage of development, the first step is to publish course-centred e-education resources, such as course materials, on the Internet and establish a platform connecting teaching resources, teachers and learners (Peng et al.,2008). The emergence of E-learning has more powerfully promoted the change of the traditional teacher-centred learning model to the student-centred model.

In recent years, the rapid development of computer and network communication technology has promoted the mutual integration between face-to-face teaching and online learning environments. Blended learning has become a hot research topic in higher education, training, and primary education because of the combined advantages of face-to-face and online learning. Its development and application in the field of higher education is particularly remarkable. The New Media Alliance Horizon Report (Higher Education Edition) listed integrated learning as a trend of increasing popularity in the short term for three consecutive years in 2015, 2016 and 2017. More and more universities at home and abroad realise the significance of blended learning in higher education and carry out blended learning widely.

The concept of blended learning was developed in the 1960s. However, the term was formally introduced in 1999 in a draft for the name change of an educational Interactive Learning Center in Atlanta, which stated that "the company, which currently operates 220 online courses, will begin offering online courses using blended learning methods." In the following decades, scholars have different opinions on the concept definition and model design of blended learning. For example, Driscoll believes that there are four other concepts of blended learning: First, the integrated learning process can be a mixture of teaching objectives based on web technology, and second, it can be the mixing of teaching techniques and methods. The third is mixing all forms of teaching technology (such as video and film) with classroom teaching. The fourth is combining technology and a specific learning task to achieve a particular effect of learning. All four of his concepts are based on mixing techniques to accomplish a specific task of learning or improve learning outcomes. In 2006, Bonk and Graham, in their book Handbook of Blended Learning: Global Perspectives, Local Designs, defined blended teaching as A learning system combining face-to-face teaching and computer-aided instruction.

In China, the concept of "Blended Learning" (Blended learning or blended teaching) was introduced in 2003. It was first formally put forward by Thomas Hogg at the 7th Global Chinese

Computer Applications in Education Conference. He pointed out that blended learning integrates the advantages of traditional classroom learning and modern networked learning. Teaching practice should reflect students' initiative as learning subjects and take students as the centre. Still, attention should be paid to the leading role of teachers in the teaching process. The blended learning mode is a profound reflection on the educational teaching practice guided by constructivism theory. After that, the thoughts and ideas of domestic educational technology have undergone profound changes, and many academic researchers have carried out teaching reform on this opportunity(Li Xin,2019).

However, in recent years, some scholars have investigated the status quo of blended learning for some students, and the situation could be more optimistic. The following data on students' perceptions of blended learning are available.

The results of the "Students' Understanding of Blended Learning" survey show that less than half (38%) of students in the major understand the concept of blended learning, 44% of students are not very familiar with blended learning, and the last 18% of students are not familiar with blended learning. (Xia Guangmei, Xue Jingwen, Lu Gaojin, &Ji Xingxiang,2021)

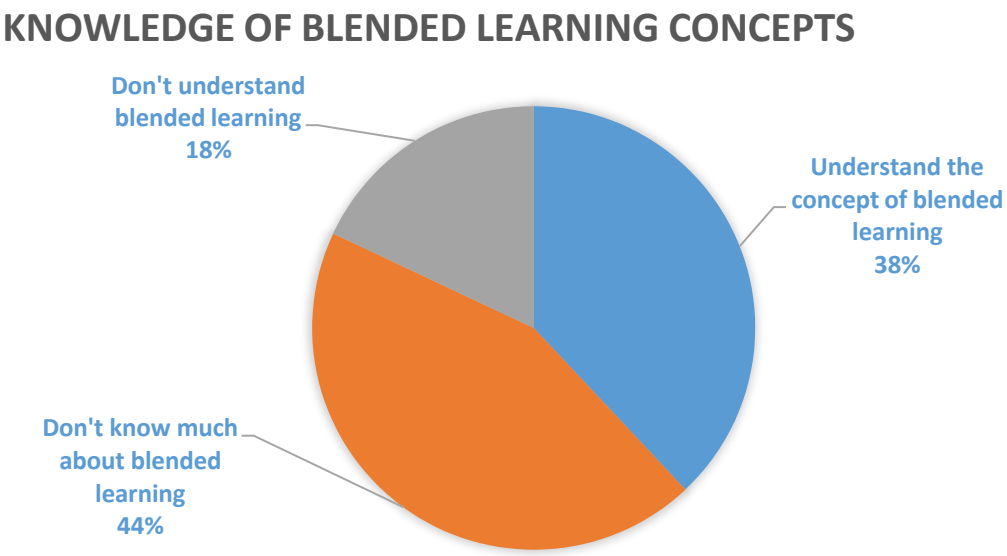


**Figure 1**: Knowledge of blended learning concepts

Xia Guangmei et al. (2021) expressed that students' understanding of blended learning could be more specific. 11% of students think Blended learning refers to teachers teaching and completing online tasks, 20% of students believe Blended learning refers to offline self-study plus face-to-face teaching by teachers in class, and only 69% of students believe Blended learning is complementary learning of "face-to-face teaching by teachers plus online resources".

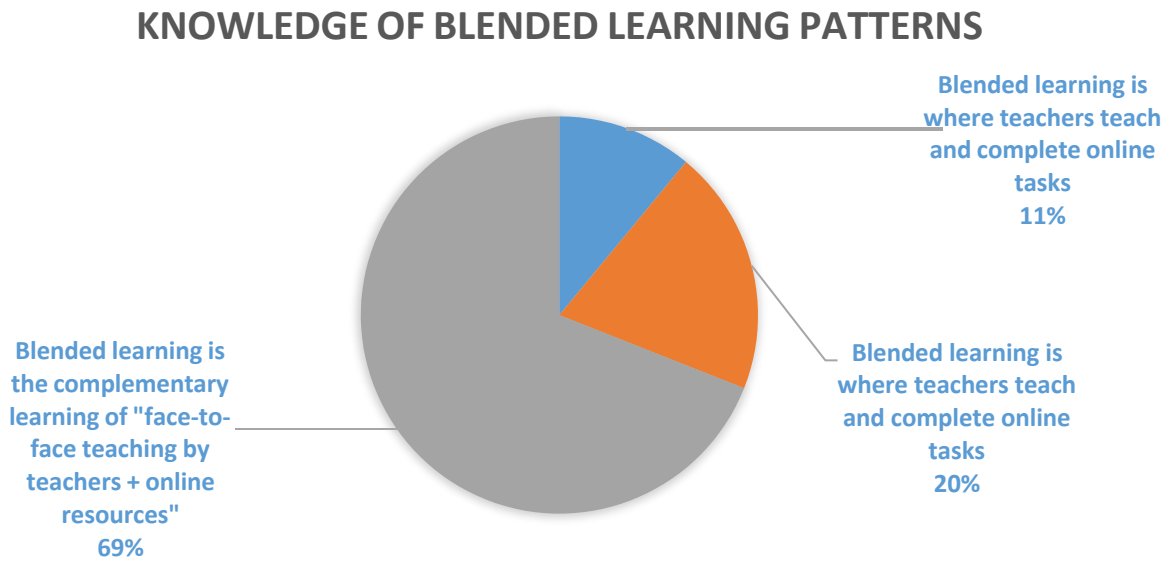


**Figure 2:** Knowledge of blended learning patterns

Xia Guangmei et al. (2021) expressed that this is related to the fact that Blended learning is not widely used in most courses. The survey showed that 77% of students said Blended learning was used in some courses, 16% believed it was used in most courses, and the rest did not know if Blended learning was used in their courses. In a word, students need to learn more about Blended learning.

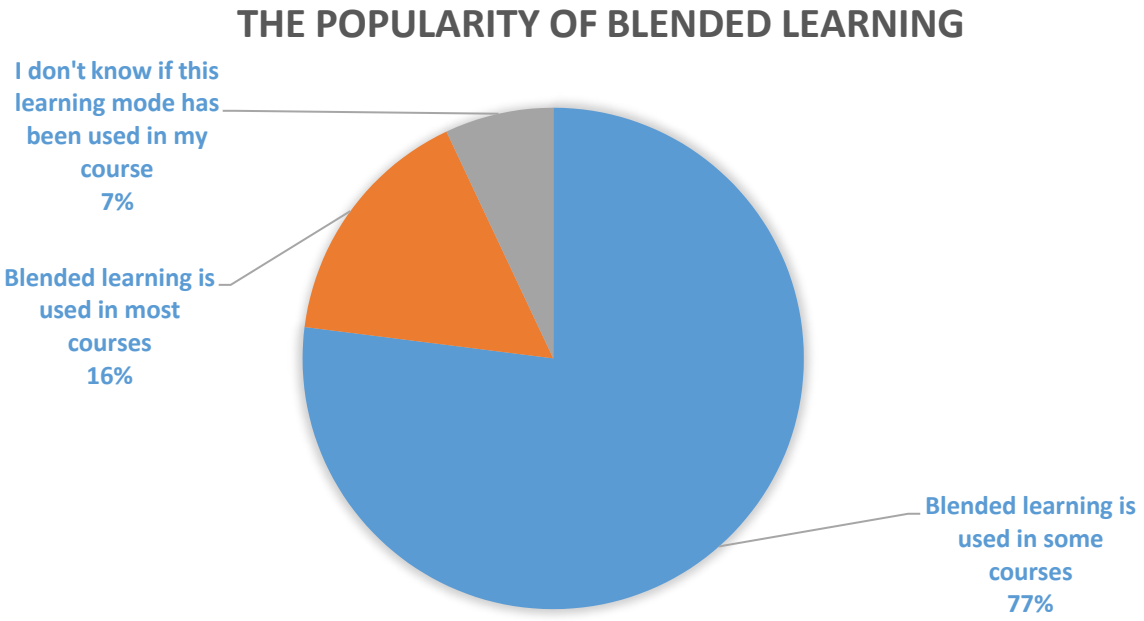


Figure 3: The popularity of blended Learning

With the development of digital technologies such as artificial intelligence, big data, and the Internet of Things, promoting the deep integration of information technology and teaching has become the mainstream educational informatisation development. As leaders and practitioners of information-based teaching, college teachers must be familiar with the operating procedures of various digital software and platforms. For example, college teachers must be proficient in using digital teaching platforms such as Rain Classroom, Chaoxing, DingTalk, and ZOOM to conduct online teaching. Alternatively, the ability to blend teaching. (Dan Wu Gang, Li Yuting, &Wang Haifu,2022) To cope

with the development needs of digital transformation, teachers can optimise the teaching environment from the hardware level, improve teaching capabilities from the soft power level, innovate teaching evaluation, improve teaching management levels, etc., to enhance professional capabilities and cultivate professional qualities. In the era of digital intelligence, teachers' ability to skillfully use smart devices, tools, resources and platforms to optimise the teaching environment is the basis for teachers' professional development. First, organise diversified teaching activities with the help of intelligent classrooms. Multimedia tools in smart classrooms can facilitate teachers to create immersive audio-visual environments and interactive experience situations, carry out personalised teaching, game-based teaching, group collaborative learning and blended learning, stimulate students' interest in education, and improve teaching efficiency and quality.(Zhu Ke,Kang Liuyi,Wang &Jianming,2023). It can be seen that teachers' digital literacy has a significant impact on students' blended learning.

## RESEARCH QUESTIONS

a. What are teachers' digital literacy effects on blended learning?
b. What are the effects of policy support on blended learning outcomes?
c. How does teachers' digital literacy affect students' self-perception?

## SIGNIFICANCE

### Theoretical Significance

At a theoretical level, studying the impact of teachers' digital literacy on students' blended learning effects can inspire improving teachers' digital literacy and comprehensive capabilities in information technology applications. Analysing the impact of policy support and students' self-perception on students' blended learning effectiveness will help to establish a more comprehensive model of factors influencing blended learning effectiveness and provide theoretical support for practical work.

### Practical Significance

From a practical perspective, explore the impact of teachers' digital literacy and policy support on improving students' blended learning effects. On the one hand, it can enhance teachers' digital literacy, and at the same time, it can also enhance students' digital literacy and blended learning capabilities. More effective methods for improving students ' combined learning effects can be derived with an in-depth understanding of the three factors of teachers' digital literacy, policy support, and students' self-perception. These methods can be applied in the daily teaching work of teachers and students to improve teachers' teaching efficiency and learning effects.

## LITERATURE REVIEW

From the nature, characteristics and value of E-Learning teaching environment. Students from the past "human learning" to "machine learning", the status of teachers from the central position to the marginalised, and some people even think that teachers' "teaching ability" has been completely abandoned. What else can teachers do in an e-learning environment? The role of the teacher is no longer to impart knowledge. In the e-learning environment, various new teaching methods characterised by students' independent learning, inquiry learning, and collaborative learning significantly impact the traditional teaching environment of "chalk and blackboard" and the teaching mode of teachers' speaking and students' listening. E-learning requires a change in the role of teachers. Teachers in colleges and universities face unprecedented challenges, and their ideas, knowledge structure and teaching behaviour must be changed entirely.

It must be pointed out that although E-Learing provides us with better teaching resources and environment and requires teachers to change their roles promptly, the status and role of teachers are still critical. Teachers are still the implementers of teaching and the guides of students' learning, and they still play a leading role in teaching activities. However, the constructivism theory, which most experts recognise, holds that people themselves construct knowledge, but construction occurs in

communication with others and is the result of social interaction. The learning process of students is the process of interaction with teachers. What teachers convey in students' learning process is very important and directly affects the learning and development of students. Teachers' behaviour is related to students' achievement, and the importance of teachers in teaching cannot be denied. Alexander's research found that if only the application of information technology itself does not improve learning, then the application of new technology is usually regarded as only technological reform. At the same time, the real reform lies in changing learning activities, teachers' guidance activities and training organisation concepts. The key to the success of the reform and the improvement of teaching quality lies in teachers. (Peng Yuanling& Zhang Chuansui,2008)

However, E-learning has some drawbacks. First, learn about individual flaws. E-learning can only partially replace teachers' classroom teaching and lacks teachers' deep participation. How to give play to the guiding role of teachers or experts in e-learning, the influence of personality and the penetration of learning and research methods have become common concerns. From another educational perspective, teachers need help grasping whether students learn in front of PCs. E-learning requires students to be more conscious; some must adapt to new learning methods and tools. Therefore, some experts suggest that E-Learning should return to traditional education─second, practical problems. To truly acquire knowledge and master technology, listening to others explain is far from enough; we must operate and practice, such as network demonstration, which is conducive to the vivid transmission of information. However, to truly master a technology, students must be allowed to use it in a natural environment, and practical performance is also the point that E-Learning needs to be improved. Third is the issue of content. Another major shortcoming of E-Learning is the dull content and lack of interaction. If we only transfer textbooks into courseware, students' learning will fall into passivity and rigidity. To solve this problem, we need to make teaching arrangements according to the characteristics of the curriculum and provide teaching tools and situational learning (Ye Jing,2010).

Traditional offline learning takes teachers as the centre and imparts knowledge as the primary purpose, and students' learning enthusiasm and initiative can not be developed. The emergence of a student-centred communicative approach has brought about significant changes in classroom teaching, and teachers pay more attention to cultivating students' comprehensive learning abilities. However, the time and space of classroom teaching are limited, and the number of classes is large. It is difficult for teachers to impart knowledge, cultivate students' learning abilities, and teach students according to their aptitudes. With the rapid development of computer technology and network technology, the use of new computer technology has become an essential means of learning, from the initial multimedia teaching in the classroom to the later online learning. With its unique advantages, such as rich multimedia resources, convenient collaborative communication and friendly interaction, network learning has developed rapidly and tends to replace traditional classrooms. However, with the continuous development of online learning research and practice, people gradually find that online learning also has many shortcomings, which are less convenient and effective than imagined and can not wholly replace teachers' classroom teaching and students' offline learning. Most teachers and scholars are actively exploring teaching reform, hoping to find better teaching and learning methods. Thus, the blended learning model emerges. It combines the advantages of traditional classroom teaching and online learning so learners can learn more effectively(Xu Hong,2014).

The traditional classroom teaching mode, on the one hand, is conducive to giving full play to the dominant position of teachers, enabling them to fully grasp the teaching progress, ensuring the systematic acquisition of knowledge by students, and thus improving the teaching efficiency; on the other hand, the face-to-face classroom teaching enhances the communication between teachers and students, helps to establish a solid teacher-student emotion, and cultivates students' correct outlook on life and values. With the development of network technology, the application of information technology in education is more and more extensive, and the disadvantages of traditional classroom teaching modes are gradually prominent. In the teaching process, teachers are mainly the centre, which weakens the principal position of students and puts them in a passive position to accept knowledge. The traditional teaching mode is challenging to teach students according to their aptitude and needs to include students' differences.

## INTRODUCTION

Unlike traditional classroom teaching, blended learning comes into being under the background of the development of information technology. According to relevant studies, teachers' digital literacy impacts combined learning. College teachers' digital literacy level is one of the most critical factors affecting whether the current "Internet +" teaching can be carried out smoothly. ( Xu Ye,2020).

By analyzing the research on blended learning by many scholars, we can find that blended learning is not only an important issue in China but also an essential issue in the world. The digital transformation of education has become a shared global agenda and process. Many international organizations have published essential documents in this field and proposed corresponding courses of action and principles. UNESCO released the "Guidelines for the Preparation of Educational Information and Communication Policy and Planning" in 2022. In higher education, it emphasises expanding access to higher education, encouraging blended learning, developing research networks, improving administrative efficiency, supporting communities, and Five major action lines, including sustainable development, promote the digital transformation of higher education (Zhang et al.,2023). With the progress and development of the times, information technology has become the application technology of people's daily life, study, work and other occasions. With the progress and development of the times, information technology has become an applied technology in people's everyday lives, study, work and other occasions. By giving full play to the role of modern educational technology, we can fully mobilise students' learning enthusiasm, improve students' learning interest, effectively reform teaching, fundamentally improve teaching efficiency and improve teaching effect. Research shows that learners' characteristics, learning motivation, information literacy and learning style, teaching ability, teaching involvement, teaching activity design, teacher-student interaction, and resource environment are the most direct factors affecting learning performance. In contrast, the policy environment is the most crucial factor affecting learning performance. Other factors play an indirect role. The policy environment indirectly affects blended learning performance, which indicates that the driving force of combined learning development in our country comes from the support of national policies. (Jia Nan, Dai Xinlai, & Zhang Yuxin,2021)

Analyse the characteristics of students. Social and technological developments at different times can influence the formation of students' new characteristics. College students' learning characteristics form from personal and social factors. From a social point of view, everyone is influenced by the social context of the time, thus creating universal learning characteristics. The current information technology environment will profoundly impact college students' learning characteristics, such as fragmented learning, dependence on the Internet, and greater self-study tendency. Various factors influence these salient characteristics, including family, society, and school. Only by analysing multiple influencing factors and understanding the changes in college students' learning characteristics can we improve the learning efficiency of college students under the background of information technology and promote their learning progress. (Ma Xinyue, 2021)

Analyse learning patterns—the focus of the classroom shifts from the teacher to the student. To advocate blended learning is not to deny the traditional teaching mode but to advocate using the latest technology to optimise teaching and better solve the problems in the teaching process. The conventional teaching mode is mostly teacher-centred, teaching according to their own experience, teaching content, and teaching methods, and seldom paying attention to the learning needs of students. This one-size-fits-all approach leads to a lack of pertinence in teaching, making it difficult to mobilise students' enthusiasm and initiative. Blended learning inherits the advantages of the traditional teaching mode. It uses information technology to transform the classic teaching mode centred on "teaching" into the mode centred on "learning" to stimulate students' learning interest to the maximum extent and improve the teaching effect. Therefore, blended learning is a new teaching mode worth promoting in the information technology era. (Wang Yuanbin, 2006)

The most important manifestation of improving teachers' digital literacy is the thinking in information-based education practice. Digital literacy is the flexible use of tangible "technology" reflected in specific educational and teaching practices and the transformation of thinking in practical teaching. Teachers' improvement of digital literacy is not only to achieve digital education but also to

keep pace with the times and improve teaching by improving digital literacy. If you move traditional classroom teaching to the Internet for teaching, it is not entirely blended learning and does not fully use the characteristics of blended learning. Therefore, it is essential to improve teachers' digital literacy. Teacher digital literacy includes five dimensions: digital awareness, technology knowledge and skills, digital applications, digital social responsibility, and professional development. In blended learning, teachers are the leaders, and students are the subjects, which can fully mobilise students' subjective initiative and maximise their learning enthusiasm. At the same time, it can also reflect teachers' digital literacy and teaching performance, providing a more critical reference for improving blended learning in the next step. (Hu Xiaoyong, Li Wanyi, &Zhou Yanni, 2023)

## Review Of Significant Evidence on Variables

First, explore the influencing factors of blended learning. With the in-depth development of educational informatisation, emerging learning models such as online, mobile, and ubiquitous learning have gradually been integrated into college education and teaching. For example, before class, the teacher releases the class content in the institutional space, and the students use the resources in the textbook and online learning space to preview, discover problems through the preview, and send questions to the teacher. Teachers can track and detect students' preview status at any time to adjust teaching content and plans promptly. During the class, the teacher explains and organises the course content based on the questions asked by the students during the preview and conducts effective teacher-student and student-student interactions (Li et al., 2019). There are more and more studies on blended learning (teaching) at home and abroad, but most are based on teaching cases. Few studies define the teaching effect and teaching quality of blended learning. Therefore, exploring the influencing factors of blended learning has important theoretical significance and practical application value for an in-depth understanding of blended learning, improving teaching plans, and improving teaching efficiency and quality. (Wang Yu'e & Wang Juan2020).

Second, research on the influencing factors of learning effects. Starting from different learning models such as distance, online, and blended learning, scholars have deeply explored the impact of social factors such as students' personal, family, and education. The effect of technical factors such as teacher and peer interactivity, interface design, task technology matching, and scene experience on students' learning performance was studied. The impact of subjective factors such as students' independent learning, learning experience, and learning willingness on students' learning performance was studied (Jiang Xue, 2022). In 1989, Chinese scholar Anderson put forward his view. He believed that students, teachers, and the environment are the three significant factors that affect learning results. In 1995, Li Hao started with the psychological factors of college students and proposed that the psychological factors that affect college students' learning effects are mainly personal learning motivation and learning attitude. Bai Xueyun proposed in 2004 that teachers' teaching, management and learners' psychological factors jointly affect learners' learning effects. Yuan Aiqing proposed in 2006 that in addition to learners' psychological factors, course evaluation and interaction will also affect the learning effect of learners' cooperative learning. In addition, Wu Fenfen and Anderson agree with the views above. She divided the influencing factors of learning effects into three aspects: learners, teachers and environment (Fan Bo, 2022). Internationally, research on factors influencing learning effects began in the 1980s. In the social education model proposed by Gardner, the main factors affecting the effectiveness of foreign language learning are summarised as individual differences, and learning motivation, interest, attitude and talent are the key points covered by individual differences. Among them, learning motivation has the most significant impact and is the key to whether learners can achieve good results. Motivational factors accompany other factors. In addition, scholar Emmanuel Fokides verified the influencing factors of the gamification learning effect based on the structural equation model. Through research, the team proposed that learners' learning motivation and the quality of learning resources will affect learners' perception of the ease of use of gamified learning, thereby affecting its learning effect (Fan Bo, 2022).

Third, teachers' digital literacy and blended learning are essential manifestations of digital education. In May 2022, at the Third World Conference on Higher Education, UNESCO published "Beyond the Limits—New Paths to Reshape Higher Education" The report pointed out that "digitisation is one of the main factors driving the reshaping of higher education." In September of the same year, the

United Nations "Education Transformation Summit" stated that "the digital revolution will become one of the most powerful tools to ensure high-quality education for all and transform the way teachers teach and students learn." The digital transformation of education has become a shared global agenda and process. Many international organisations have published essential documents in this field and proposed corresponding action guidelines and principles. UNESCO released the "Guidelines for the Preparation of Education Information and Communication Policy and Planning" in 2022. Higher education emphasises expanding access to higher education, encouraging blended learning, developing research networks, improving administrative efficiency, and supporting communities. Five major action lines include sustainable development to promote the digital transformation of higher education. Regarding "capacity" building, it is necessary to formulate digital education standards, improve teachers' digital literacy, and build schools' digital capabilities. Digital education standards include government and school evaluation, digital curriculum, and teacher and student evaluation standards. Teacher capacity building has digital literacy frameworks and training. Teachers should take advantage of the online learning space, rationally use peer assistance strategies to promote the formation of a learning community, promote the standard progress of all students, and promote a broader range of resource sharing and knowledge construction. (Zheng Lanqin, Li Xin, Huang Ronghuai, & Chen Fengying, 2017). Teachers should use cyberspace to encourage learners to learn independently, build a learning community, carry out a series of activities around knowledge understanding, and give full play to the advantages of personalised learning. (Wang Hui, 2016).

Fourth, we research relevant policies involving teachers' digital literacy. Internationally, teachers' digital literacy and skills have gradually become the focus of widespread attention, and some international organisations and countries have proposed relevant frameworks or standards for teachers' digital technology applications. For example, in 2011, UNESCO released the "Teachers' ICT Competency Framework", which comprehensively describes the abilities teachers should have to use technology for effective teaching; in 2016, Austria released the "Teachers' Digital Literacy Framework" to guide teachers' digital literacy Development and assessment of literacy. In 2017, the United States released the ISTE Educator Standards, which proposed reasonable technical competency standards based on the role of teachers. In 2017, the European Union released the "European Digital Competence Framework for Educators", which provides a framework for educators at all levels and types of schools to assess and develop digital capabilities comprehensively. In 2017, Spain released the "Teachers' Universal Digital Competency Framework" to help teachers acquire digital capabilities through self-assessment and updating. In 2017, Norway released the "Digital Competency Framework for the Teacher Profession" to promote teachers' professional development and practice in the digital era. In 2019, the UK released a professional framework for digital teaching to help teachers identify how digital technology can enhance teaching. In China, the country has permanently attached great importance to developing teacher quality under digital conditions and accelerated the formulation of relevant standards. At the first World Digital Education Conference held on February 13, 2023, the Ministry of Education officially released the "Teacher Digital Literacy" industry standard, clarifying the core connotation and indicator framework of teachers' digital literacy and providing guidance for education management departments, schools and educational institutions and developing teachers' digital literacy. It also provides a basis for constructing, monitoring, and evaluating teachers' digital literacy training resources (Wu et al., 2023). In the actual teaching of teachers, although most teachers are optimistic about discussion-based classrooms, during the actual use process, it is found that the various technical problems encountered have not received timely technical support to a large extent, resulting in low enthusiasm of teachers... The use of this type of classroom has declined. It is hoped that relevant functional departments can strengthen real-time technical support in the school in the future, create a good usage atmosphere, and teach better. In addition, teachers also undertake some scientific research tasks in addition to teaching, which leaves teachers with insufficient energy and time to explore the application of discussion-based intelligent classrooms. It is recommended to optimise the performance appraisal mechanism, enhance teachers' sense of accomplishment in teaching reform, set up a particular project for discussion-based teaching reform, and provide support and encouragement from the aspects of policies and systems (Wang et al., 2020). In short, good policies can effectively promote improving teachers' digital literacy.

## Theoretical Framework

TPACK: Mishra and Koehler (2006), scholars at Michigan State University in the United States, proposed a subject-teaching knowledge framework that integrates technology to explain how technological knowledge is combined with teachers' original knowledge structures. Once this framework was proposed, it attracted widespread attention from researchers in theoretical research and practical exploration. In 2014, TPACK theory became one of educational technology's essential theoretical foundations and research hotspots. It was included in the latest global educational technology development planning program version. Documentation - Handbook of American Educational and Communication Technology. So far, the subject teaching knowledge integrating technology has been identified by international education researchers as structured knowledge that describes teachers' ability to use technology to teach. (Meng Chong, 2021).

KSAO model theory: In 1991, American scholar Harvey proposed the KSAO model, which stands for Knowledge Skill Benefit Others. It is a model used to describe the job competencies of human resource managers. It combines the personality psychology model and the interactive framework of organisational creativity. Both aspects can effectively integrate personality and professional traits and are widely used in human resources research. Based on the KSAO model, the elements of teacher data literacy are expressed as follows: K (Knowledge) refers to basic knowledge related to data. S (Skill) refers to operational skills related to data in real situations. A (ability) refers to the general ability to carry out educational and teaching activities. O (Other Attributes) refers to other attributes related to data, including data. First, data awareness refers to acquiring, using, sharing, and updating data science knowledge, security awareness, and relevant laws and regulations. (Hu Binwu, Lin Shanding, & Shen Ji, 2013)

Constructivist learning theory: The prosperity and development of the education field cannot be separated from the guidance of relevant theoretical foundations. Constructivist theory is learner-centred and emphasises that learners should actively explore knowledge, discover new knowledge, and construct the meaning of learned knowledge to achieve genuine knowledge construction. This is the core of constructivist theory. The deepening of contemporary educational reform cannot be separated from the guidance of constructivist theory. In blended learning, learners can develop essential skills such as independent learning, innovation, and cooperation through the correct guidance of constructivist theory. Currently undergoing the digital transformation of education, the hybrid teaching model is based on the educational concept of constructivism. It is learning-centered, demand-driven, and data-empowered. It is an organic mixture of academic forms, technologies, disciplines, and resources. It is a perfect match for teaching. Transformation and redesign of traditional curriculum. (Zhang Jianxia, 2023)

## Conceptual Framework

This is my conceptual framework. Factors affecting blended learning mainly include internal factors and external factors. Teachers' digital literacy and policy support are external factors, and self-perception is an internal factor. Teachers' digital literacy and policy support are independent variables, students' self-perception is the mediating variable, and the effect of blended learning is the dependent variable.

Effects of blended learning: Through blended learning, students experience changes in cognition, skills, problem-solving abilities, teamwork, and emotional attitudes.

In this study, teachers' digital literacy includes four aspects: information knowledge, skills, abilities, and ethics. I will research teachers' digital literacy from these four dimensions. These four dimensions are based on the KSAO model proposed by American scholar Harvey in 1991, which is a model that describes employees' professional qualifications in human resource management. On the other hand, the proposal of the above four dimensions also draws on the TPACK framework proposed by American scholars Koehler and Mishra based on the subject teaching knowledge PCK submitted by Shulman.

Self-perception: In 1989, Davis proposed the technology acceptance model to explain users' acceptance of information technology. Davis and his team believe that "perceived usefulness" refers to the extent to which users believe that the effectiveness of a specific tool or method has improved.

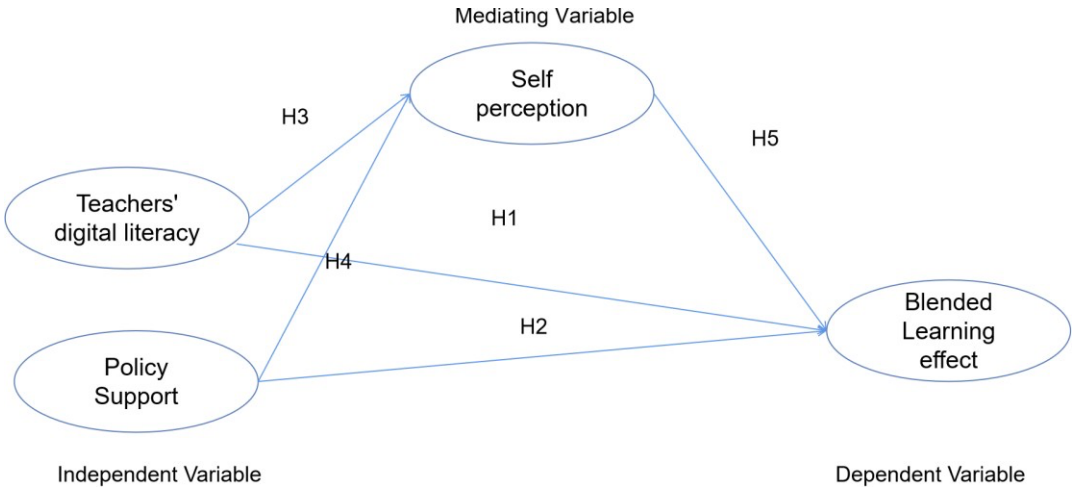


Figure 4: The Conceptual Framework

## Hypothesis Development

This study explores the relationship between teachers' digital literacy, policy support, students' self-perception and blended learning effectiveness, and their impact on blended learning effectiveness. We hypothesised that higher teacher digital literacy would be positively associated with the increased efficacy of hybrid schools.

Hypothesis 1: A statistical relationship exists between teachers' digital literacy and blended learning. Improving teachers' digital literacy and enriching teaching methods can effectively promote students' blended learning.

Hypothesis 2: There is a statistical relationship between policy support and blended learning outcomes. The promulgation of policies conducive to blended learning will bring more development opportunities to blended learning, a better development platform, and better learning. Effect.

Hypothesis 3: A statistical relationship exists between teachers' digital literacy and students' self-perception. Teachers with better digital literacy can better guide students to learn, make students' self-perception better, and learn more efficiently, achieving better learning results.

Hypothesis 4: There is a statistical relationship between policy support and students' self-perception. Policy support is conducive to creating a better student learning environment and promoting students' learning, making learning more accessible and more functional.

## Methodological Issues & Gaps

With the intelligent development of information technology, the challenge is no longer the realisation of information technology to support teaching but the awareness of when to apply technology and the flexible decision of how to use technology. (Liao Hongjian, Zhang Qianwei,2017) Therefore, in blended teaching, the two modes of online and face-to-face teaching are organically integrated to give full play to the advantages of the two modes to achieve the best teaching effect. (Jia Zhenxia, 2021) Different standards emphasised teachers' innovative construction of teaching resources and learning environment, urged teachers to evaluate the teaching process and teaching effect when using information technology, and proposed new teaching strategies and methods based on the evaluation and evaluation. This highlights that teachers and students should use information technology creatively to achieve better learning results (Ma Xinyan,2019). This paper will further prove the impact of teachers' digital literacy on blended learning through investigation and research.

Blended learning consists of two parts: online and offline. Offline learning has been developed for many years, has a long history, and has been relatively mature. Online learning comes into being with the development of information technology. As a product of integrating information technology and education, open online courses are significant in expanding the dissemination of high-quality

educational resources. On this basis, online learning and online available courses break the restrictions of traditional classroom teaching, increasingly highlight the colour of learning autonomy, enhance the motivation of students to learn, create new opportunities for the development of higher education, and therefore put forward higher requirements for teachers' digital literacy.

To further promote the comprehensive and sustained improvement of teachers' digital literacy, it is necessary to improve teachers' awareness, conduct assessments, and strengthen training in the future to achieve accurate evaluation and personalised development of teachers. Countries worldwide, including China, have issued many policies on improving teachers' digital literacy. Relevant policies can be personalised according to teachers' different subjects and majors. Focusing on creating a precise training model for teachers' digital literacy, analysing and exploring teachers' development status and training needs, building a new curriculum system with the theme of integration of digital technology and disciplines, comprehensively improving the quality of courses and training effects, and carry out digital application-based courses based on real application scenarios. Teaching research and activities continue to promote improving teachers' digital literacy and form new mechanisms, scenarios, and models conducive to developing teachers' digital literacy(Wu Di & Chen Min, 2023). This article will research strategies to improve teachers' digital literacy. In the past two years, digital technology has continued to advance, bringing unlimited possibilities to the development of higher education. In higher education institutions worldwide, digital applications are reshaping the models of education, school running, and management in newer and more powerful ways. They provide important guarantees for the reconstruction of education in the epidemic context. Discussions about the role of faculty in the digital transformation of higher education have intensified in recent years. In "Beyond the Limits: New Paths to Reshape Higher Education", proposed by UNESCO at the Third World Conference on Higher Education, higher education in the next ten years will be coordinated with other education stages, and the digital transformation of university teachers' capabilities will become the focus of improving the quality of education. Teachers' digital literacy will be critical to issues related to educational equity, quality and efficiency, such as how to implement inclusive and high-quality blended teaching, how to use digital technology to reshape existing curriculum and assessment models, and how to improve institutions' digital capability building. effect（Feng Siyuan&Huang Chen, 2023）.

Mr. Xia Zehan, representative of the UNESCO Representative Office in China, pointed out that teachers are the core of digital transformation. University teachers must be at the heart of digital transformation and the revolution in higher education institutions. Educating university teachers with the necessary digital skills and core competencies is crucial to our goals of modernising and transforming higher education, teaching, and learning systems and processes. Colleges and universities should focus on cultivating teachers' information screening abilities and cultivating students' critical thinking. Teachers can better realise the digital economy and green transformation by continuously improving teaching skills, updating teaching methods, and improving digital literacy. As the COVID-19 pandemic forces teachers to shift to online teaching, it is also necessary to equip teachers with comprehensive facilities and continuously improve teachers' digital skills to cope with the growing demand. In an era of rapid development of globalised information, developing digital capabilities is more critical than ever. All teachers must follow basic information technology security guidelines to help young people and educators use the Internet ethically, responsibly, and effectively. So as not to have too much of a negative impact on students.

By understanding the above content, we analysed that the following situations still need improvement.

First, there is insufficient research on the impact of teachers' digital literacy on the effectiveness of blended learning. Using digital technology, teachers can create new teaching scenes, adopt new teaching props, provide diversified educational services, etc., to enhance student's learning experience and enter a state of practice and learn in real situations. In addition, digital technology can help teachers collect various data types, including students' learning status, learning effectiveness, etc., to build a scientific and efficient educational evaluation system to form a student-centred personalised teaching model and realise a "data-driven hybrid". Learning" and "life is education" are boundaryless learning.

Second, the policy has not further played a role in improving teachers' digital literacy and improving the learning effects of blended learning. Policies are an essential guarantee for enhancing teachers' digital literacy. The state and local governments should formulate and improve relevant laws and regulations, planning outlines, standard guidelines, etc., clarify the connotation, goals, requirements, and evaluation system of teachers' digital literacy, and provide clear direction and basis for improving teachers' digital literacy. At the same time, we should increase funding and build a complete information infrastructure and resource platform to provide good conditions and environment for teachers to improve their digital literacy. Digital professional development is an integral part of the professional ability development of higher vocational teachers. Only by participating in relevant training and competitions on educational digital technology and applying the acquired content to daily education and teaching activities can higher vocational teachers effectively improve their digital literacy. At this stage, the digital professional level of some higher vocational teachers needs to be improved. First, for most higher vocational teachers, daily teaching, scientific research, competitions, and other work consume a lot of their energy, resulting in a lack of time and energy to explore and learn digital technologies, platforms, software, etc., which to a certain extent affects the quality of higher vocational teachers. Vocational teachers use digital technology to innovate education and teaching. Secondly, some higher vocational colleges lack systematic management systems and incentive measures to improve teachers' digital literacy and do not link teachers' digital literacy levels with performance, year-end assessments, professional title evaluations, etc. This also affects teachers who are deeply involved in digital teaching innovation. There is a lack of explicit encouragement and support, so it is not easy to stimulate teachers' enthusiasm for digital education and teaching innovation. Finally, the digital training for teachers in some higher vocational colleges is small in quantity and lacks targeted content. It is challenging to meet the needs of teachers of different age groups, different subject backgrounds, and different levels of digital literacy. This is not conducive to a certain extent. Improve the digital literacy of higher vocational teachers. (Feng Yanhua, 2023).

Third, it is necessary to improve students' self-perception and the effectiveness of blended learning. Perceived usefulness and perceived ease of use jointly affect the learner's behavioural intention to influence the effectiveness of blended learning. (Research on factors influencing the effectiveness of blended learning for college students (Fan Bo, 2022). Perceived usefulness is students' subjective perception that using technology in an integrated learning environment can better help them learn. The design and development of online learning platforms function as a factor that affects students. One of the factors of learning satisfaction and effectiveness, the perceived ease of use of the platform, will determine whether students are willing to use the platform (Li Bao, 2016).

## METHODOLOGY

This chapter mainly introduces this paper's research methods and design, determines the population and samples, and collects and analyses the data of teachers and students.

## Research Design

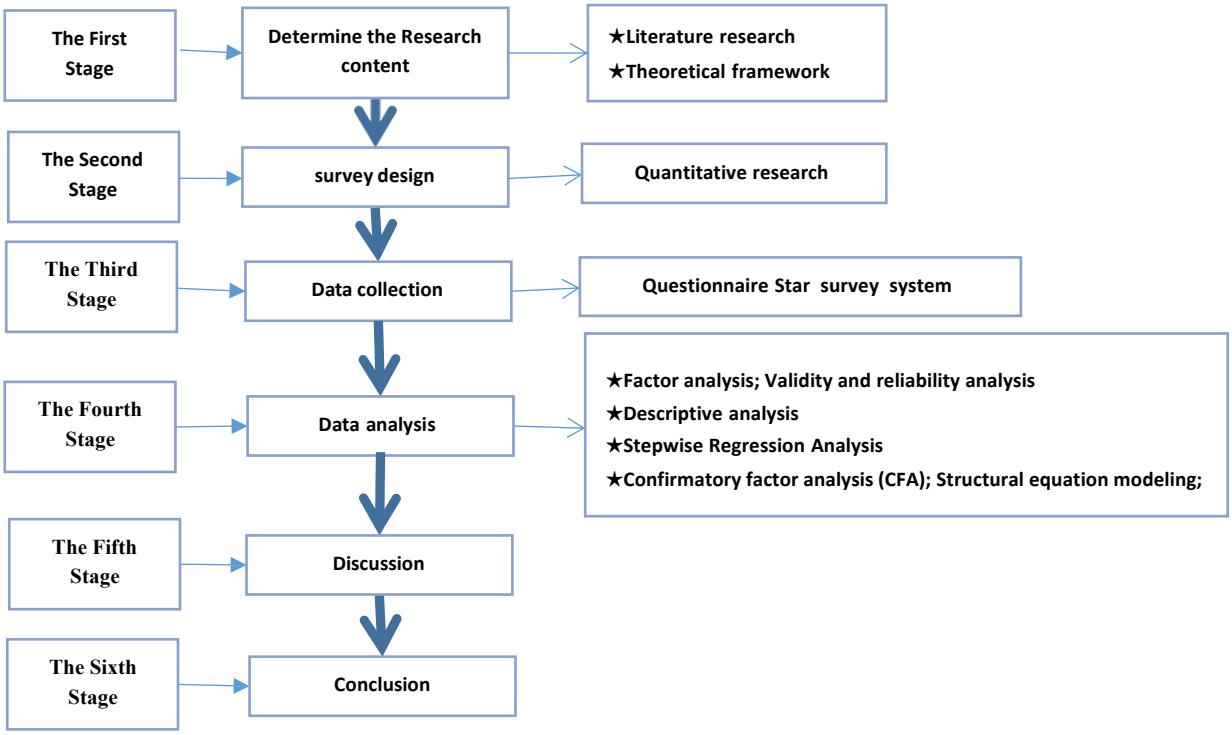


**Figure 5**: Research steps chart

## Sample

I will use stratified random sampling to select ten higher vocational colleges in Guangdong Province for research. In China, the Guangdong-Hong Kong-Macao Greater Bay Area has many universities and higher vocational colleges, a developed economy, a large population, and a high level of educational development. Therefore, by choosing the Guangdong-Hong Kong-Macao Greater Bay Area as the research location, teachers in this school district should have higher digital literacy and better educational resources, and blended learning should be more effective. The total number of teachers in the ten higher vocational colleges selected by the plan is about 7,300, and the total number of students is about 145,000. After calculation, it is planned to issue at least 366 valid questionnaires to teachers and at least 384 valuable questionnaires to students.

## Questionnaire design

A structured questionnaire will be designed to collect relevant data. The content of the questionnaire will cover the current status of teachers' digital literacy, current policy support, students' self-perception, and students' blended learning effects. The questionnaire will include various question types, such as Likert scale items, multiple-choice questions and individual open-ended questions to gain a comprehensive understanding of teachers' digital literacy and students' blended learning.

## Data collection

The questionnaire is mainly written in Chinese to adapt to different people's English proficiency, and it takes 15-20 minutes to complete. After determining the content of the formal questionnaire, a stratified random sampling method was used to distribute the online questionnaire to relevant higher vocational colleges in Guangdong Province to obtain authentic, representative, and stable survey results. This questionnaire survey is planned to be distributed to teachers and students. It is designed to send web links to teachers and students as questionnaire stars, asking them to complete it. Researchers will

provide a clear purpose of the survey and guarantees of confidentiality, encourage students to voluntarily participate, and ensure the confidentiality of their personal information.

## Data analysis

To verify the theoretical hypotheses, SPSS, PLS-SEM, and Mplus software were used to analyse the data. Analyse and demonstrate the basic information of each variable through descriptive statistics, regression analysis and other analysis methods, and deeply explore the relationship between several variables.

## Results and discussion

The results of the data analysis will be summarised, analysed and presented in the paper. This article will discuss the implications of the findings, including the current status of teacher digital literacy, the role of policy support and students' self-perceptions on the effectiveness of blended learning, and the issues that arise. Researchers will propose improvement plans for the identified problems and offer strategies to improve students' mixed learning effects by enhancing teachers' digital literacy.

## Propose intervention countermeasures.

Based on the questionnaire survey results and the problems discovered, this article will propose constructive and feasible countermeasures to improve teachers' digital literacy. These strategies enhance students' learning abilities and improve blended learning outcomes.

## Conclusion

This study will summarise the study's main findings, highlighting the impact of teacher digital literacy on blended learning. At the same time, the study's limitations will be recognised, and recommendations for future research will be made. Finally, the results of this study will guide Chinese higher vocational colleges to improve teachers' digital literacy and students' blended learning effects.

The purpose of this study is not just to report correlations and generalisations. The survey will analyse teachers' experiences to inform future research on enhancing teachers' digital literacy in vocational colleges, which may confirm the findings in a larger sample size.

For the student. Teachers' digital literacy can help students carry out blended learning, make students pay more attention to online learning, and enrich students' learning channels.

For the teacher. Improving teachers' digital literacy makes schools pay more attention to online teaching, provides more training and learning opportunities for teachers, and improves the ability of blended teaching.

For the college. Improving teachers' digital literacy enables teachers to establish a student-centred and education-oriented modern teaching concept, strengthen the need for teachers' self-development and the awareness of lifelong learning, and promote students to learn knowledge with the help of information technology.

For the country. Teachers' digital literacy is an essential part of digital education, which is a vital force to promote the development of digital China.

## Ethical considerations

When conducting a questionnaire survey, you must be fully prepared, respect the wishes and ideas of the respondents, and abide by relevant ethics and regulations. We will protect the privacy of teachers and students participating in the questionnaire survey and all participants' legitimate rights and interests.

## Summary and conclusion

The literature review plays a vital role in the paper and is the basis of the entire paper. We need to read a large amount of literature. When reading previous literature, we can continuously accumulate and learn from previous experiences, discover the characteristics and advantages of other people's research, find the direction of research, clarify the content of research, and at the same time, let ourselves understand the status of research and its shortcomings. On the other hand, it is also possible to get new

inspiration and discoveries from other people's research, find a new way, and provide more solutions to solve problems.

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