



# Behaviors, Satisfaction and Expectation of e-Learning from the Perspective of Higher Vocational Students in China A Comparative Study Between 2019 and 2022

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**Abstract.** E-learning becomes a mainstream form to provide school education. This study shows the behaviors, satisfaction, and expectation of e-learning in higher vocational education in China before and during COVID-19. Questionnaires and interviews were conducted both in 2019 and 2023, more than 759 students from a higher vocational school located in South China had participated in this study, provided information of e-learning experience in 2019 and 2022. The study shows that e-learning happens in all learning phases, helps students overcome learning obstacles, even during school closure. Students from different majors are satisfied with e-learning provided by higher vocational education especially the digital learning platforms. Compares with the situation in 2019, students experienced 5 weeks of distance learning in 2022, more than 70% students experienced same or even better learning experience during distance learning with the help of e-learning. Detail explanation and discussion is also discussed in this paper.

**Keywords:** e-learning · higher vocational education · ICT · comparative study

## 1 Introduction

The highly development of ICT (Information and Communication Technology) has paved the way for the combination of new technology and teaching and learning methodologies. Teaching and learning through internet and multimedia, such as e-learning, becomes a mainstream form to provide school education. However, e-learning effect is highly affected by the behaviors, satisfaction, and expectation of the students. Attitude and feedback of e-learning from the perspective of students would optimize the e-learning platform and learning process.

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Meanwhile, COVID-19 has impacted education, especially school education at all level globally. The closure of school brought new challenges for teachers and students worldwide, ICT was used to solve the problems of the changing needs of school education [12]. Distance learning through ICT became a trending method. Researchers have done studies focusing on teaching and learning strategies [6], national, institutional, and pedagogical responses [7, 13]. Many studies have paid attention to primary or secondary education [9, 10], higher education [1, 14]. Changes in vocational education, especially the behavior, satisfaction and expectation of students have been underestimated in academic research [5].

## 2 Research Questions and Objectives

The utilization of emerging technologies has been demonstrated to augment learning and augment student success through e-learning [15]. Such technologies have transformed the way we teach and learn - from in-class education to distance learning, from text books to e-libraries and online course. Higher vocational students have already adopted e-learning method in school education, the way they react also make a difference to such teaching methodology and improving related ICT. Also, higher vocational schools have been closed for several months due to the impact of the pandemic. Students experienced a special e-learning period from in-class blended teaching to online distance learning.

Under this specific background, this paper aims to provide information on the behavior, satisfaction, and expectation of e-learning from the perspective of higher vocational students, find out the influence brought by the pandemic, make suggestions to e-learning technologies and teaching design.

In order to achieve this goal, this paper focus on the following questions.

1. What is the e-learning behaviors, satisfaction and expectation of Chinese higher vocational school students?
2. What is the difference in Chinese higher vocational school students' e-learning behavior, satisfaction and expectation on the aspect of major, or digital learning platform?
3. What is the difference in Chinese higher vocational school students' e-learning satisfaction and expectation before and during COVID-19?

## 3 Literature Review

### 3.1 e-Learning

e-learning is an important area emphasized in education with the development of ICT. The term "e-learning" is not a unified form of specific learning or teaching, but represents a collective term for various teaching-learning scenarios using online media [2]. Therefore, e-learning can be simply regarded as a general term that displays various forms of electronic based learning, which is mostly done through Internet, including online learning, distance learning and blended learning. Such as courses allow digital collaboration and technology assisted distance learning.

To some extents, e-learning is an alternative of traditional and it can also be a complementary to it [8]. Researches have demonstrated the significance of e-learning, suggesting that it has the potential to enhance learning at different level and improve student achievement with emerging technologies [15].

### **3.2 e-Learning in Vocational Education**

e-Learning is proved to be an effective way of improving teaching and learning quality, even in vocational education and training (Belaya, 2018). For students, e-learning brings flexibility of choice of place, time, learning pace and content, increase of motivation with visualizations, simulations presentation of learning materials and interactive exercises. But on the other hand, e-learning also brings challenges to some students. Learners who have a low degree of self-discipline, time management may experience more distractions than learning in the class. Therefore, study e-learning behaviors, satisfaction and expectation has an important role in improving e-learning technology and educational design.

Chinese higher vocational education originated in 1970s. Nowadays, it has entered the new era of high-quality development [11] after 40 years of development. e-Learning which is designed for blended learning in class and distance learning is being promoted since 2012. Digital learning platforms as new teaching and learning tools have been created for higher vocational education.

From 2019 to 2022, teaching forms and methods have been challenged due to COVID-19. In 2020, the Ministry of Education of People's Republic of China issued a policy named "classes suspended while learning continues" during school closure. Vocational schools in China made full use of their e-learning resources to support students for distance learning [3]. Regarding to the main form of e-learning of higher vocational education, digital learning platform/software play a very important role.

A study in 2020 focus on online learning in Chinese vocational education, delivering questionnaires to 767 schools, finds that different students had different preferences for online learning during distance learning and most of them own a positive learning attitude (Han, Zhou, Shi & Yang, 2020). However, there is little comparative studies focus on e-learning behaviors, satisfaction and expectation before and during COVID-19. In order to studies this situation, the author conducted a comparative study of a higher vocational school in China.

## **4 Methodology**

In order to answer the research questions, this study adopts a mixed method including questionnaires and interviews.

### **4.1 Questionnaires and Interviews Design**

Two anonymous questionnaires are designed to analyze the e-learning behavior, satisfaction and expectation of higher vocational students. Survey A studied the situation of 2019 (before COVID-19) and survey B studied the situation of 2022 (during COVID-19).

**Table 1.** Demography information of participants

Demography		Survey A in 2019	Survey B in 2023
Gender	Male	29.11%	14.43%
	Female	70.89%	85.57%
Professional specialty	Arts specialty	61.52%	66.67%
	Science specialty	38.48%	33.33%

Questions design of the two questionnaires are mostly the same. Both in survey A and B, there are 4 questions focusing on the demographic information of students, 16 questions focusing on the behavior, satisfaction and expectation of e-learning experience. Additionally, survey B includes extra 4 questions concerning experience of “distance learning”.

In addition to questionnaires, semi-structured group interviews are conducted to find out the detail expectation of e-learning setting. Two groups of 9 students with different major had joint the 30-min interview.

## 4.2 Data Collection

Participants of this study come from the same higher vocational school (School A) located in Guangdong Province, China, which has nine second-class colleges with more than 10 thousand students. This higher vocational school is a comprehensive school, ranking top 15 in China, and its teaching arrangement is representative in Chinese vocational education.

Survey A was conducted in September and October in 2019, studied the e-learning experience in period from February to July 2019, when the students studied at school. Survey B was conducted in February in 2023, look into the situation in period from September 2019 to January 2023, when the students experienced 4–10 weeks of distance learning regarded to their learning arrangement.

Both in 2019 and 2023, a group of 9 students recruited from nine second-class colleges as coordinators distributing online surveys through a questionnaire platform ([www.wjx.cn](http://www.wjx.cn)). 558 and 201 surveys were collected with survey A and B, the demography of students participants is shown in Table 1.

## 5 Results

### 5.1 Behaviors of e-Learning in 2019 and 2022

#### 5.1.1 e-Learning is the Main Channel of Learning Information Acquisition

There is little difference between data of daily online time and e-learning time in 2019 and 2022. Higher vocational students spend mostly spend 3–6 h online (39% of the participants in 2019 and 34.4% in 2022), and 1–3 h (47.4% in 2019 and 51.7% in 2022) using for e-learning (including digital learning in class and searching for learning information beyond class).

**Table 2.** Channels of learning information acquisition

	Data of 2019	Data of 2022
Textbooks and other books	69.7%	73.7%
Digital learning platforms	59.9%	66.2%
In-class lecture	65.2%	65.2%
Other network resources	30.8%	35.8%
Practice training and internship	16.3%	11.9%

**Table 3.** Learning behaviors in different learning phases

	Prepare before class (data of 2019/2022)	Learn in class (data of 2019/2022)	Review after class (data of 2019/2022)
Books & textbooks	49%/41%	68%/72%	45%/38%
Digital learning platforms	20%/22%	61%/62%	26%/29%
Other network resources	13%/16%	46%/48%	21%/23%
No prepare or review	18%/21%	/	8%/9%
Offline activities	/	17%/26%	/
In-class lecture	/	30%/33%	/

**Table 4.** Digital learning platforms usage in 2019 and 2022

Year	Major	ICVE	Mosoink	Chaoxing	Weizhiku	UMOOC	iCourses	others
2019	Arts	<b>46%</b>	<b>58%</b>	<b>42%</b>	9%	19%	6%	7%
	Science	<b>42%</b>	23%	<b>55%</b>	28%	<b>31%</b>	11%	4%
2022	Arts	<b>67%</b>	11%	<b>72%</b>	4%	<b>58%</b>	10%	9%
	Science	<b>94%</b>	4%	<b>60%</b>	34%	<b>52%</b>	10%	1%

Meanwhile, both in 2019 and 2022, higher vocational students acquire learning information through multi-channels (Table 2). When we consider “digital learning platforms” and “network resources” as e-learning channels, e-learning is the main choice for higher vocational students’ learning (Tables 3 and 4).

### 5.1.2 Mobile Devices Are the Primary Means to e-Learning

With the development of mobile Internet and related ICT, the number of users of smart phones and other mobile devices in China has been increasing year by year. According

to the “2021 Statistical Bulletin of National Economic and Social Development”, the number of mobile Internet users is 1.029 billion.

School A, the investigated higher vocational school is located in the economically developed Guangdong-Hong Kong-Macao Greater Bay Area, and the students basically own one or more smart phones, which provides hardware support for further expanding the application scenarios of e-learning.

In this study, more than 85% of students (89% in 2019 and 85.1% in 2022) consider smartphones are the main Internet access tool compared to computers and tablets. During interviews, students explained “The everyday instruments must include mobile phones. And it will be inconvenient if the learning task requires computer only.”

### 5.1.3 e-Learning Behaviors During Different Learning Phases

This study investigated the main learning styles of higher vocational students in different learning phases. The data shows that the combination of online and offline resources is the main method for students to learn.

Specifically, students mainly use books and textbooks preparing before class, use books and e-learning materials during class and review with books and textbooks again after class. In other words, e-learning occurs in all learning phases and play an especially important role in in-class learning activities.

### 5.1.4 Usage of Digital Learning Platform

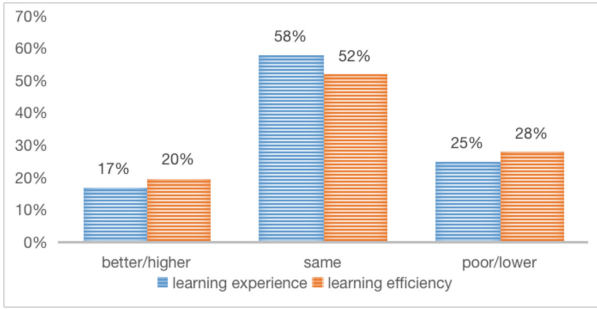
Learning with digital learning platforms is very common in Chinese vocational education. In school A, about 70% to 90% courses are teaching with digital learning platforms, which can achieve multiple functions including teacher-student interaction, self-learning, homework submission, online text and courses assessment.

There are some company providing digital learning platforms for vocational education in China, which are ICVE, Mosoink, Chaoxing, Weizhiku, UMOOC, iCourses. And the situation of platform usage has been changed from 2019 to 2022. First, ICVE, Chaoxing and UMOOC have become the main digital learning platforms more frequently used by higher vocational students. The proportion of students using these platforms increased during the past three years.

Second, in 2022, the platforms used by different professional specialties are gradually unified. Which represent that digital learning platforms providing services for higher vocational education are more compatible with different disciplines with more mature functions.

Among the learning resources provided by various digital learning platforms, courseware, text (cases, reading materials, etc.) and question bank are the most frequently used resources. This kind of resource mainly realizes the function of resource dissemination and testing in the platform, while the use frequency of more interactive resources, such as games, remain relative low in both 2019 and 2022.

As for the process of using the digital learning platform, class interaction (62%), assignment submission (58%), online testing (39%), online question answering (37%) are the most commonly used functions regarding to the data of 2019. In 2022, students who have experience both in-class education and distance learning from home, using



**Fig. 1.** Learning experience and efficiency of distance learning

the functions of assignment submission (69%), class interaction (66%), online testing (55%) and online question answering (39%) more often.

### 5.1.5 e-Learning During School Closure

Because of COVID-19, participants from school A spent 5 weeks studying from home during November and December 2022. 58% students rated the learning experience as the same during homeschooling, while 17% students experienced better learning experience and other 25% saying it was worse learning at home.

To be specific, when asked about the learning efficiency during distance learning, more than 52% participants remained the same efficiency comparing to school learning, 20% students experienced higher efficiency and the other 28% students showed lower efficiency (Fig. 1).

Students with higher efficiency during distance learning explained that more discretionary time, more convenient e-learning environment, and less school activities improve their learning efficiency.

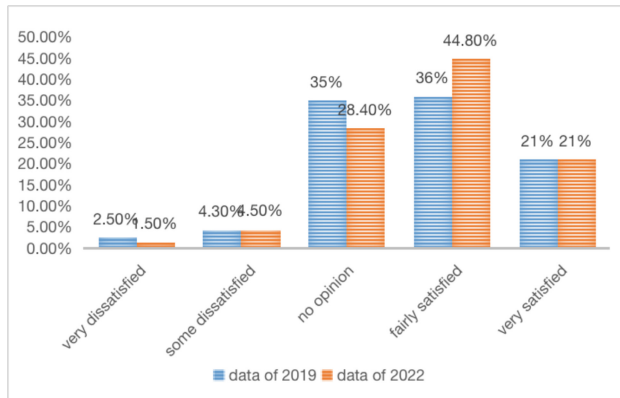
Slightly more students with lower efficiency explained that poor independent learning capacity, lack of supervision by lecturers, poor network condition brought more challenges to daily study.

## 5.2 Satisfaction and Expectation of e-Learning in 2019 and 2022

It shows that user satisfaction is one of the most important factors in assessing the success of system implementation [4]. A Likert Scale is used to study the satisfaction of digital learning platforms in both questionnaires of 2019 and 2022. As shown in Fig. 2, more students were satisfied with the digital learning platforms in 2022.

And although the design of digital learning platforms is getting better during the past few years, there are still some obstacles with e-learning according to this research.

The top three challenges of e-learning in 2019 are “network problems” (inconvenient Internet access, slow Internet speed), “lack of user-friendly design” and “platform design cannot meet the learning needs”, accounting for 57%, 48% and 42%. The main obstacles remain the same in 2022, although the rate of each elements dropped (51% voted for



**Fig. 2.** Satisfaction of digital learning platforms in 2019 and 2022

“network problems”, 43% voted for “lack of user-friendly design” and 36% voted for “platform design cannot meet the learning needs”).

The result shows that ICT development has improve e-learning experience in some way, but there are remaining technical challenges to overcome to improve the quality of e-learning.

Expectation of e-learning with digital learning platforms is similar in 2019 and 2022, learning resources storage, online resources sharing, interaction and teaching method are most concerned elements.

## 6 Discussion and Conclusion

### 6.1 e-Learning is the Main Channel for Higher Vocational Education

Both in 2019 and 2022, students acquire learning information from multi-channels including textbooks, in-class lecture and online resources. And when we consider “digital learning platforms” and “network resources” as e-learning channels, e-learning is the main choice for higher vocational students’ learning. About 60% students gain learning information through digital learning platforms.

About 70% to 90% courses are teaching with digital learning platforms. As for the learning behavior before, during and after class, e-learning plays an important role for higher vocational education. Especially when learning in class, more than 60% students gain information with the help of digital learning platforms.

Comparing the situation in 2019 and 2022, there is no significant change of learning behavior of higher vocational students. e-Learning occurs in all learning phases and learning habits before, during and after class remain almost the same.

### 6.2 Students Are Satisfied with e-Learning in Higher Vocational Education

More than half students are “fairly satisfied” or “very satisfied” with the digital learning platform (the most common form of e-learning in vocational education). And more



**Table 5.** Time spending online and e-learning in 2019 and 2022

	Daily online hours (%)					Daily e-learning hours (%)				
	<1	1–2.9	3–5.9	6–7.9	>8	<1	1–2.9	3–5.9	6–7.9	>8
Data of 2019	5.6	23.6	39	21.6	10.2	30.3	47.4	15.3	5	2
Data of 2022	2	23.9	34.3	37.4	12.4	17.4	51.7	22.8	6	2

students were satisfied in 2022 than 2019, suggesting that the e-learning technology and study design is getting better.

Besides, with the development of mobile Internet and ICT, e-learning through mobile devices bring huge convenience to students. In class, students could sign-in, discuss, raise questions, assess easily with their smart phones. Beyond class, students could review learning materials at any time any where. e-Learning not only changes the way of education, but also reshapes students’ learning habits, making learning more personalized and diversified.

**6.3 e-Learning Enables High Quality Distance Learning**

As we can see from Table 5, students spend more time online and e-learning in 2022, mainly because the distance learning during COVID-19.

Students from school A spent 5 weeks studying at home from November to December 2022. More than half students reported that their learning experience and efficiency remained the same comparing to study in class, and even 17% students gains better experience and 20% students became more efficient during homeschooling.

e-Learning enables distance learning during COVID-19, especially for students with better independent learning capacity.

**6.4 e-Learning Still Plays a Basic and Superficial Role in Higher Vocational Education**

Although students are generally satisfied with e-learning experience, digital learning platforms just provide basic and superficial function to higher vocational education.

In 2022, there are three digital learning platforms provided most e-learning services to higher vocational students. Text such as teaching cases, reading materials and question bank are the most frequently used resources of the platforms. Functions like assignment submission, class interaction, online testing are frequently used both in 2019 and 2022. However, different kind of learning materials are mainly presented in digital learning platforms by categorized, with are easily used by teachers and students to auxiliary learning through school education, but fail to help learners achieve a higher level of independent learning.

## 7 Conclusions

The findings of this study shows the e-learning behaviors, satisfactions and expectations of higher vocational students in China. e-Learning is a main form for higher vocational education with the highly development of ICT and it becomes more and more important to guarantee the e-learning effect this days when distance learning happens occasionally.

In this study, it is found that higher vocational students in China is satisfied with e-learning provided by schools and teachers. e-Learning in higher vocational education is usually applied through digital learning platforms and there are several preferred platforms in higher vocational education for students with different majors.

e-Learning technique helps students with all learning phases. However, to achieve a higher level of independent learning for higher vocational students, interactive games, tracking and alerting of learning progress and other advanced functions are expected in future e-learning.

As for the differences between e-learning before and during COVID-19, students spent more time learning online using digital learning platforms and other e-learning materials in 2022, and even more students were satisfied with the digital learning platforms during school closure. e-Learning helps students overcome obstacles in distance learning.

In future, continuous study of e-learning behaviors, satisfaction and expectation will be conducted and the link between e-learning technology and e-learning experience in higher vocational education should be investigated. And more students could benefit from e-learning related researches.

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