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Students' attitudes on online and face-to-face learning during COVID-19 : a qualitative study

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STUDENTS' ATTITUDES ON ONLINE AND FACE-TO-FACE LEARNING DURING COVID-19: A QUALITATIVE STUDY

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ABSTRACT

Students' Attitudes on Online and Face-to-face Learning During COVID-19:
A Qualitative Study

By

LIU Yanying

Doctor of Policy Studies

The purpose of this dissertation is to explore Lingnan University students' attitudes on online and face-to-face learning during COVID-19. In early 2020, the sudden spread of the COVID-19 pandemic continued across the world and the epidemic had a profound impact on the teaching and learning. In order to reduce potential communication risks, universities have adopted the method of online learning to carry out learning task instead of face-to-face learning during the COVID-19 pandemic.

From the perspective of students, this dissertation explores students' attitudes on online and face-to-face learning during COVID-19 based on the Community of Inquiry Framework. The participants of this study are the fulltime students who studying at Lingnan University from 2020 to 2023. The research question of this dissertation is what are Lingnan University students' attitudes towards online and face-to-face learning during COVID-19 based on the Community of Inquiry Framework. This dissertation adopts the Community of Inquiry Framework as a theoretical framework to analyze the different attitudes of students in different learning modes of online and face to face learning. Based on the Community of Inquiry theory and the thematic analysis, this study uses the Community of Inquiry Coding Template to analyze the data. Methodologically, this research applies 5 one-on-one in-depth interviews with students and 2 focus groups with 10 students. Through a qualitative analysis, this research finds that the students' attitudes towards online and face-to-face learning are mainly reflected from five aspects. They are: 1). basic qualities of teachers, 2). instructional design, 3). instructional resources, 4). interaction between teachers and students, and 5). instructional mode. The implications of this research inform educational policies, pedagogy, and teaching and learning practice in higher education in Hong Kong. It also contributes to the improvement of students' effectiveness of learning. This research asserts that online learning facilitates the advancement of digital education in higher education. At the same time, digital education sets higher benchmarks and expectations for universities and instructors.

DECLARATION

I, LIU Yanying, declare that this is an original work based primarily on my own research, and I warrant that all citations of previous research, published or unpublished, have been duly acknowledged.

Signature: SIGNED

Date: 27 May 2023

CERTIFICATE OF APPROVAL OF THESIS

STUDENTS' ATTITUDES ON ONLINE AND FACE-TO-FACE LEARNING DURING COVID-19: A QUALITATIVE STUDY

by

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ACKNOWLEDGEMENTS

I always hope that I could have the opportunity to study for a doctorate, improve my ability to do research projects, and help myself to do some research projects in my future work field, hoping that I can make a little bit contribution to the development of the society. At the beginning of the epidemic in 2020, my dream finally came true, and I was lucky enough to be admitted to the Doctoral Program of Policy Studies at Lingnan University. The study days at Lingnan University were beautiful and unforgettable time in my life.

When Lingnan university arranges courses for me, I had the honor to meet my supervisor Daisy Yidan Zhu. In the process of writing my dissertation, from the topic selection, writing outline, to the revision of the dissertation, my supervisor Daisy Yidan Zhu gave me great support, warm care and clear guidance, and gave me valuable opinions and suggestions, which benefited me a lot. I would like to express my sincere thanks to my supervisor Daisy Yidan Zhu for the timely completion of my thesis and my great progress in each semester.

During my study at Lingnan University, I would like to sincerely thank all the teachers who had taught me at Lingnan University. I am grateful to my relatives and friends for their care, help, encouragement and support during my doctoral study. Grateful to all the people who helped me.

There are still many shortcomings in this Policy Study project, and I still need suggestions from teachers. Life is a process of continuous learning, and this Policy Study project of this paper is not the end. In the future, I will continue to work hard, continue to explore and research, and continue to further enhance my understanding on policy study.

1. INTRODUCTION

1.1 The Purpose

This dissertation aims to explore Lingnan University students' attitudes on online and face-to-face learning during the COVID-19 pandemic. There are three dimensions of major purpose that have been emphasized in this dissertation. First, this study compares the differences and similarities among the students' attitudes of online and face-to-face learning. By comparing the differences and similarities among the students' attitudes of online and face-to-face learning, this study explores students' attitudes on online and face-to-face learning during COVID-19 pandemic, students' preferences, learning experience, learning satisfaction, and learning effect.

Second, this study explores students' challenges and needs in online and face-to-face learning. After I study the relevant theories, historical literature and researches., I find that most of current researches focuses on teachers' perspectives without Hong Kong case and few researches pay attention to Hong Kong universities students' attitudes on online and face-to-face learning during COVID-19 pandemic. In addition to study teachers' perspectives, it is equally important to understand and study students' attitudes towards online and face-to-face teaching and learning during COVID-19 in Hong Kong, which helps to understand students' learning needs and challenges when they are facing online and face-to-face learning.

Third, this research contributes to inform educational policies, pedagogy and teaching and learning practice in higher education in Hong Kong to achieve better

performance in the teaching and learning process for Hong Kong universities after the pandemic. Since researches relevant to educational policies making effected by COVID-19 pandemic is still blank, this dissertation fills the gap through exploring students' attitudes, informing education policies and pedagogy, and enhancing teaching and learning practice in higher education in Hong Kong.

1.2 Why Lingnan University?

There are three reasons that I choose Lingnan University as a case study for my thesis. The first reason is Lingnan University takes teaching and learning seriously with great achievement in quality education. For example, Lingnan University gains 2nd worldwide in THE Impact Rankings 2023 "Quality Education". Lingnan University pursues a student-centered approach to teaching and learning, emphasizing a close relationship between teachers and students. Lingnan University emphasizes an interactive mode on teaching and learning in order to inspire students to achieve a higher level of deep thinking. In addition, Lingnan University actively adopts new technology in teaching and learning.

The second reason is Lingnan University attaches importance to online and face-to-face teaching and learning. In order to guarantee high-level and high-quality teaching and learning, Lingnan University sets up teaching and learning center providing services for supporting staff and students in teaching and learning enhancement, innovation, analytics and design. This Centre introduced Teaching and Learning Initiatives in 2017 and actively promote information and communication

technologies (ICTs) to implement and enhance online teaching and learning. This study can provide education policy recommendations on for Lingnan University and the higher education sector in the city of Hong Kong.

The third reason is that I have been studying in Lingnan University for 4 years experiencing online learning and hybrid learning during COVID19. As a Lingnan University student, it's easy to collect data of Lingnan University students' opinions and do this research from a student perspective because of my own learning experience on online learning and face-to face learning.

1.3 Research Question

The research question of this dissertation is what are Lingnan University students' attitudes towards online and face-to-face learning during COVID-19 based on the Community of Inquiry Framework. According to that research question, there are three sub-research questions that have been explored in this research. First, what are the differences and similarities among students' attitudes of online and face-to-face learning? Second, what are the students' challenges and needs in online and face-to-face learning in Lingnan? Third, how do this study inform educational policies, pedagogy and teaching and learning practice in higher education in Hong Kong?

1.4 The Major Arguments

In this dissertation, I argue that students' attitudes on online and face-to-face learning draw on five dimensions: 1). basic qualities of teachers, 2). instructional

design, 3). instructional resources, 4). interaction between teachers and students, and 5). instructional mode.

First, I argue that students prefer face-to-face learning to online learning by comparing the differences and similarities among students' attitudes of online and face-to-face learning. The students think that the face-to-face learning has more interactions and engagement than online learning and face-to-face learning is more effective. They believe that face-to-face learning has more teacher-students' interactions. They suggest online learning needs to focus more on the students' needs.

Second, I argue that the students' challenges and needs in online and face-to-face learning should be concerned. Students hope to get timely feedback from teachers when they encounter problems and they hope teachers can create a better learning atmosphere in online learning, forcing all students to turn on cameras and microphones and taking wide-angle photography to help them focus at class, increase their learning motivation and improve learning efficiency. Students suggest that teachers' skills in operating electronic devices and digital technologies should be strengthened. Students hope that teachers give students more opportunities to discuss and speak and increase more interaction with students by diverse teaching methods and materials. Students expect the teachers give guidance on dealing with online learning materials. The students tend to like blended learning with online and face-to-face learning integrated. They suggest that online learning could be used as an auxiliary mode for face-to-face learning, which could be retained even after the epidemic ended, and that teachers should save the recordings of the lessons and upload them for students to review after

classes. Moreover, students strongly suggest teachers apply advanced digital technologies in teaching and learning process.

Third，I argue that to inform educational policies, pedagogy and teaching and learning practice in higher education in Hong Kong in five aspects. Firstly, universities could establish digital training system for teachers and implement teachers training plan to improve teacher' digital literacy. Secondly, establishing intelligent classrooms and intelligent classes under online and face-to-face integrated learning scenario to meet students' learning needs and era development needs. Thirdly, promote digitalization and intellectualization of online and face-to-face integrated learning classes in universities. Fourthly, establishing digital and intelligent communication and interconnection technological channels among teachers and students so that increase teacher-student interactions and engagement and provide a comfortable and student-centered learning environment. Fifthly, establishing a high-quality intelligent education sharing platform to promote high-efficient online and face-to-face integrated learning.

1.5 Summary of Findings

This dissertation finds that students' attitudes towards online learning and face-to-face learning are mainly reflected in five aspects. They are: 1). basic qualities of teachers, 2). instructional design, 3). instructional resources, 4). interaction between teachers and students, and 5). instructional mode.

For basic qualities of teachers，the study finds that students expect immediate

feedback from teachers when they encounter problems. The students hope that the teacher can create a better learning atmosphere in online learning, and ask all the students to turn on their cameras with wide-angle photography and microphones that can help them concentrate, increase learning motivation and improve learning efficiency. Students believe that a good teacher is able to arrange the curriculum clearly and adopt appropriate teaching methods. They hold that excellent teachers can grasp key issues in class, use concise language, have clear thinking, present clear writing on the board, and can accurately convey main content, stimulate students to think deeply. Students do not want the pace of teaching to be too fast, which makes it difficult for students to keep up with teachers. Students suggested that teachers' skills in operating digital online learning technologies should be strengthened because some teachers have difficulties in that. Students prefer teachers who keep pace with the era development.

For instructional design, students hope that teachers should not only read and explain their PowerPoints, but they should give students more opportunities to discuss and speak. Students express that teachers should abandon traditional teaching methods and adopt diversified new methods, such as using games to increase interaction with students, using videos and pictures to show knowledge points, using digital technology to improve teaching efficiency and attract students' attention. Students also hope that teachers can use more real-life examples, make use of some Internet hot spots and social news to design courses so as to attract students' attention. Students also suggested that teachers could break up long lessons into several sections to avoid

students' absent-minded situations, as well as ask more questions to stimulate students' thinking. Moreover, students expect that office hours should be increased so that they can have more time to discuss with teachers. Students believe that too much theoretical knowledge will make students lose interest in online learning. They prefer tasks with moderate difficulty and combined with practice that can stimulate students' subjective initiative.

For instructional resources, the students are satisfied with online learning materials because online learning materials can be reused. They can study and review them anytime and anywhere. Students suggests that the teachers should enrich online learning materials and make them be diversified, not limited to courses recording. Some students hold the view that online learning materials is sufficient to help students but they may not read all the materials without the guidance and help of the teachers. Sometimes students do not know how to deal with so many complex online materials. Besides that, some students suggest that the network stability should be improved, otherwise many works will be forced to delay or extend working hours, which makes many online learning become time-consuming and inefficient.

For interaction between teachers and students, students consider courses with less interaction to be poor classes. Less interaction is reflected in the lack of communication with students, and students do not have chances to answer questions, discussion, etc. Students prefer teachers who allocate moderate tasks to them, more interaction and give timely and effective feedback. Students suggest that the teachers could utilize the breakout room function of Zoom for more group presentations and

projects as well. Students hold that they should be encouraged to participate in activities actively because extracurricular activities can relieve students' pressure. Some students are too shy or unsure of their answers to participate in activities, so teachers can open up comment sections so that students can participate in discussions anonymously and openly. Students suggest that online learning can arrange more time for answering questions and discussion.

For instructional mode, blended online and face-to-face learning is more popular among students. However, students more prefer face-to-face learning. They are more inclined to have online classes during pandemic, face-to-face communication with teachers for ask questions, and then review and consolidate through course recording after class. The students suggest that online learning could be used as an auxiliary mode for face-to-face learning, which could be retained even after the epidemic ended, and teachers should save the recording of the lessons and upload them for students to review after classes. The students hold the view that online and face-to-face learning are not contradictory. They can happen synchronously.

1.6 Structure

This dissertation consists of 7 Chapters. Chapter 1 is mainly specific introduction about this dissertation. It introduces the purpose, the research question and the major arguments of this dissertation.

In Chapter 2, I introduce the background of this dissertation from three aspects.

In Chapter 3, I read and study relevant historical theories, literature and practical

researches on online learning, face-to-face learning and students' attitudes on online and face-to-face learning. Chapter 3 presents clear picture on the current research status of those three aspects. Therefore, it's easy to find research gap for wring this dissertation and choose famous and well-developed theory as theoretical framework and research methods for the dissertation.

Chapter 4 is about theoretical framework of the dissertation. This dissertation applies the famous and well-developed Community of Inquiry theory and utilizes Community of Inquiry framework as theoretical framework of the dissertation.

Chapter 5 is the research methods that is applied in this dissertation. This part describes how the research applies 5 students' one-on-one in-depth interviews and 2 groups with 10 students focus group as research methods to collect data and analyze the data. The research uses thematic analysis based on Community of Inquiry Coding Template to process the data. Through qualitative analysis, the research analyzes the different feelings of students in different learning modes of learning according to three kinds of existence in Community of Inquiry theory based on the collected data.

Chapter 6 draws the findings of the research and this part elaborates on each research findings in detail.

The content of Chapter 7 primarily concerns with discussion, policy implications and conclusion. This section further describes and discusses the research findings of the research question. At the same time, this section points out the limitations of this research, and suggest further research topics or directions basing on this research. This section proposes policy implications for both Lingnan University and for higher

education in the city of Hong Kong according to the research findings and practical situation. And then this section provides conclusion for this dissertation.

All those mentioned above are the structure of the whole dissertation.

2. BACKGROUND

From the 1950s, digital technology emerged and digital computers began to replace analog computers. We gradually moved from the electrical age to the information age. Computers reshaped the structure and values of society. Nowadays every word we write is digital, every book we read is digital, and every photograph we take is digital. Digital vision has become a survival instinct embedded in our genes, and we now live in a digital world.

In early 2020, the sudden spread of the COVID19 pandemic continued across the world. The epidemic has had a profound impact on the education. To prevent spread of the COVID19 pandemic, digitalization has offered new possibilities for education in the midst of the epidemic, and universities have actively carried out online learning in the Spring Festival semester of 2020.

As the epidemic has been effectively controlled, universities have resumed classes in the autumn semester of 2020, but the epidemic is still spreading abroad, especially the emergence of mutated strains such as Omicron, which increases the risk of COVID-19 transmission. In order to reduce potential communication risks, some universities have adopted blended learning, actively explored and promoted the reform of digital learning.

There are mainly three backgrounds in this part. They are: 1) The World Online and Face-to-face learning During COVID-19; 2) Online and Face-to-face learning of China During COVID-19; and 3) Online and Face-to-face learning of Lingnan

University.

2.1 The World Online and Face-to-face Learning During COVID-19

The outbreak of COVID-19 in early 2020 has a wide range of radiation, a long duration, and a strong impact. Mehri Madarshahi who is from International Center for Creativity and Sustainable Development of UNESCO points that the coronavirus pandemic, which has locked up half the world's population, is the worst shock to the global economy during peacetime in nearly a century. Due to the impact of COVID-19, many schools and universities have been closed, classes have been suspended in most countries, and the learning of countless children and adolescents has been disrupted, severely impacting education worldwide. Online learning has become an inevitable choice for global educational institutions. According to UNESCO, as of March 30, 2020, the COVID-19 pandemic has led to the suspension of 1.53 billion students worldwide, accounting for 87.6 percent of students all over the world. Online learning, as a form of teaching that has been carried out for many years, has instantly gained wide attention and become an inevitable choice for global educators and teachers. To this end, many universities around the world are engaged in formulating online education strategies, improving students' online learning experience, and constantly promoting online knowledge sharing and learning on a global scale to promote the realization of educational equity. The COVID-19 pandemic has changed the teaching process at universities, with many countries and governments resorting to online learning to avoid the spread of the virus and ensure continuity in the education

process in response to small and seasonal outbreaks at any time.

2.2 Online and Face-to-face Learning of China During COVID-19

In response to the crisis in education and teaching brought about by the COVID-19 epidemic, all schools and universities of China adopted online teaching in spring semester in 2020. 10.845 million teachers offered 17.1968 million online courses, and 3.537 billion college students participated in online learning. It has successfully achieved the goal of ceaseless teaching and ceaseless learning. The autumn semester has seen a decisive victory in epidemic prevention and control across the country, and face-to-face classes are resumed. However, with people of returning from foreign countries and seasonal outbreaks, cluster outbreaks occur from time to time, and education begins to enter the post-epidemic era. In this era, normal prevention and control is accompanied by normal teaching activities, and the integration of online and face-to-face learning is bound to become the main mode.

2.3 Online and Face-to-face Learning of Lingnan University During COVID-19

The COVID-19 has highlighted problems in many universities, such as inadequate digital technology support, poor operation of online learning models, weak teacher and student partnerships, lack of cross-departmental operation capacity, and outdated educational management models. In addition, universities are faced with major challenges such as innovating teaching models, improving teachers' teaching skills, enhancing students' learning ability, rationally allocating learning resources, and

strengthening cooperation between education departments.

During this pandemic, the management of technical equipment and facilities has become the biggest challenge that the world's education system is facing. Facing the epidemic crisis, Lingnan University promotes the development and popularization of online learning, develops online learning strategies, improves students' online learning experience, and constantly promotes online knowledge sharing and learning globally to promote the realization of educational equity. Lingnan University is committed to achieving a dynamic balance between the three functions of scientific research, teaching and social service, striving to promote the harmonious symbiosis between ideological value and instrumental value, enhancing the value of university education, and cooperating with other sectors of the society to cope with the crisis.

Lingnan University has given full play to its essential functions and formed an emergency mechanism and measures integrating scientific research, teaching and service. To enhance students' learning interest and relieve students' psychological pressure, Lingnan University actively carries out academic lectures, Webinars and online open courses with global cooperative universities, experts and scholars, and encourage students to participate those learning obtaining corresponding credits during this pandemic. Through online learning, students can communicate with faculty and partners from the world's top universities and share learning experiences and fun with each other without leaving home.

At the same time, students can also obtain certifications when they complete online courses, which verifies the skills and knowledge gained. With the effective

control of the epidemic, the blended learning is still carried out simultaneously to help students review what they learned. That continues until the beginning of 2023 when Lingnan University resumes face-to-face learning completely.

3. LITERATURE REVIEW

This dissertation provided literature review on three dimensions. First, it reviewed previous studies of students' attitudes on online and face-to-face learning. Second, it reviewed the literature of online learning. Third, it studied blended learning.

Based on this literature, this dissertation identified three research gaps that need to further elaborated. First, it focused on filling in the gap on the study of Lingnan University as a case. Because Lingnan University as a liberal arts university takes teaching and learning seriously with great achievement in quality education and Lingnan University attaches importance to online and face-to-face teaching and learning. In addition, I have been studying in Lingnan University for 4 years experiencing online learning and hybrid learning during COVID19. As a Lingnan University student, it's easy to collect data of Lingnan University students' opinions and do this research from a student perspective because of my own learning experience on online learning and face-to face learning.

Second, it can fill in the gap on the study of Lingnan University students' attitudes on online and face-to-face learning during COVID19 pandemic.

Third, it can fill in the gap on the study of attitudes from Lingnan University students who experienced both online and offline learning at Lingnan University during COVID19.

All those three gap elements must be satisfied at the same time are allowed to be as qualified data in this dissertation.

3.1 Students' Attitudes on Online and Face-to-face Learning

From the perspective of students, it is helpful to investigate and analyze students' opinions on online, face-to-face and blended learning, factors that affect their understanding and absorption of knowledge, as well as explore coping strategies, which can help improve higher education.

By means of online questionnaire, Zhou et. al. (2021) carried out a questionnaire among 3501 undergraduate that participated in online learning in a medical college in Anhui Province of China. They found that the teachers spent more energy and time than normal teaching to find online teaching resources, extract chapter content, as well as prepare adequate exercises for their students.

Therefore, most students can feel the objective and subjective support from teachers, and generally believe that teachers can provide them with more help. Rich network resources, repeated learning methods, online discussion, random response, bullet sharing and other online teaching and learning methods make students' online learning space more free, instant interaction more convenient, and online learning experience richer. The results showed that teachers invest more energy in online resource preparation, classroom teaching supervision and online teaching interaction than traditional classroom teaching.

In addition, experiment and practice is an indispensable part of medical education. Although some courses have carried out virtual simulation experiment teaching to break the limitation of resources and space, virtual cannot replace reality after all, and proper operation exercises are still needed to consolidate the learning content and

improve the learning effect. It indicated that students' online learning pressure and challenges mainly come from the lack of self-learning awareness. In terms of environmental factors, they are often interfered by various family factors and lack of self-supervision awareness and consciousness.

Moreover, online learning lacks the competitive learning atmosphere among classmates, which more or less affects students' learning effect. In the aspect of personal factors, students' self-discipline is also affected by their personality, psychological quality and future career expectations. Therefore, college education should not neglect the cultivation of students' self-discipline

Besides that, different course attributes and different teachers will bring different online learning experiences, which all reflect the defects of pure online learning. For example, online virtual experiments cannot completely replace clinical practice, and teachers and students cannot or are inconvenient to communicate and interact with body language and emotions through the screen. Therefore, online learning enables teachers and students to feel the convenience of Internet education (Zhou et. al. ,2021).

Kang (2022) analyzed university students' attitudes toward online learning through an online questionnaire. 346 questionnaires were collected. Most of students think they have less free time because teachers are unable to give real-time guidance and answer questions as face-to-face learning or traditional classroom. Therefore, teachers also assign more homework. Fewer students said they had more time because teachers could not pay attention to and interact with each student as they did at face-to-face learning class, so they sometimes did other things at online class. Other

drawbacks commonly cited by students include visual fatigue caused by prolonged screen time, poor self-discipline, and a home environment that is not suitable for study. This feedback also indicates that there is a lack of learning atmosphere and participation in online learning.

Experimental courses, physical education and other courses are limited, and there is no place and equipment, so teaching and learning is very difficult to implement. Although more students used online learning platforms before the pandemic (including but not limited to Massive open online courses, Bilibili, etc.), they still have different opinions on online learning in higher education. 36.22% students think online learning is appropriate, because they can watch the course repeatedly, learn again and again according to their actual learning situation, and learn freely. But 29.94% of the students thought it was not appropriate, and the other students did not make a decision.

At the same time, the satisfaction of online learning also showed the same situation, with 39.82% students satisfied and 35.92% students dissatisfied. From the perspective of students, it is more difficult to process information in online learning environment. One third of students think that it is difficult to interact with teachers at online learning classes, the learning atmosphere of the class is not strong enough, individual questions and doubts are not timely answered, and they cannot describe their problems or show their content through blackboard writing or other means. Most of teachers also believe that the difficulty of online learning lies in the inability to effectively interact with students, which is also the advantage of face-to-face teaching.

Kang (2022) takes attitude that online learning has attracted attention in the

context of the epidemic due to its flexibility and convenience, and it is foreseeable that online teaching will still be an important teaching means after the epidemic. However, the existing survey from students' perspectives results show that online learning lags behind traditional face-to-face learning to some extent on education quality and interaction with students, and a variety of objective and subjective factors affect the quality.

Wu (2021) conducted questionnaire survey. The questionnaire consists of 25 questions, includinglearning attitude, learning needs, evaluation of online teaching, etc. The respondents were the students of North China Institute of Science and Technology. A total of 634 valid answers were collected through online sampling. SPSS was used to build the database, and descriptive, frequency and multiple noise analysis methods were adopted.

In this study, male students accounted for 54.1% and female students accounted for 45.9%. The subjects of the survey were mainly science and engineering students that the percentage is about 67%, and the percentage of liberal arts students is about 33%. The research data shows that among the survey respondents, 74.92% students said they could carry out online learning activities smoothly, while 25.08% students could not carry out online learning normally. The prominent influencing factors were bad network signal accounted for 14.98%, terminals (such as mobile phones, computers, etc.) unable to meet the learning needs accounted for 4.42%, and other personal reasons accounted for 5.68%. More than half of the students that accounted for 54.57% use mobile phones as their main learning tool, 41.8% use desktop

computers and laptops, and the least use tablets accounted for 3.63%. 63.41% of the students studied more than 10 hours and 34.07% more than 15 hours per week. Many students began to suffer from eye discomfort. 82.18% of the students said they had been stuck or interfered with by the outside world in their study.

In online learning, students mainly focus on three contents and they are classroom homework which accounts for 83.91%, learning progress which accounts for 79.18% and score statistics which accounts for 61.20%. The number of students who choose these three contents is 532, 502 and 388 respectively. The most preferred teaching resources of the survey subjects are teacher video, accounting for 83.28%, followed by extended video materials and courseware, accounting for 57.41%, more than half of the students choose text materials, accounting for 50.95%, and 37% of the students prefer question bank.

The research data shows that teachers' video recording, extended video materials and courseware are very important items in online class. The results showed that the interaction of online classes is not as ideal as expected. 7.41% of students often interact with teachers, 45.43% interact with teachers when they have questions, 30.76% interact with teachers occasionally and 16.4% do not interact with teachers. The data shows that students' interest in online learning methods and content is declining. 44.32% are generally interested, 17.82% are not interested, 11.04% are very interested in online learning, 26.81% are interested, there is little difference between male students and female students. Students' interest in the online teaching mode began to decline compared with the early stage, but they still have certain expectations.

In the survey of their satisfaction with their learning status, 36.75% respondents feel relatively satisfied with their learning status, 15.26% students are not satisfied with their learning status, 47.63% students choose general satisfaction. Students are generally satisfied with their own learning status and have a low sense of learning gain.

In terms of course duration, 36.44% students think that the best duration is about 25 minutes, 24.29% students think that the video duration should be about 35 minutes, 23.34% respondents think that the video duration should be 15 minutes, and only 15.93% respondents think that the teaching video duration should be longer than 45 minutes. Students think that in addition to teaching videos, online courses should also include courseware, course materials, announcements, course introduction, online homework, discussion and other content. Among them, the selection rate of courseware is 72.56%, course related materials 63.56%, notices 54.26%, course introduction 39.91%, online homework 38.8%, discussion 31.39%.

The most urgent help for students is that they hope teachers can strengthen or reverse key and difficult problems, accounting for 72.24%, 54.26% of students need teachers to solve the problems that they put forward in time, 39.75% of students hope teachers can timely feedback their learning situation. 34.23% of the students believed that teachers should assign homework and tests to check their learning, and 27.92% hoped that teachers would supervise and remind them during the course. According to the survey respondents, what needs to be improved in online teaching is to enrich course resources, accounting for 54.57%, optimize classroom atmosphere accounted for 49.68%, set diversified learning links and pay attention to teacher-student

communication accounted for 41.64% and 41.01% respectively. In the survey, 68.77% of students believe that the gains from online learning are as much or more than those from face-to-face learning, while 31.23% believe that the gains from face-to-face learning are greater.

Students recognized the advantages of online learning mainly reflected in the resources can be repeated, review of important and difficult points, overcome time and space restrictions, interact with teachers and classmates more freely.

In contrast, online learning has the outstanding disadvantages of putting forward higher requirements for students' self-control ability and independent learning ability, having to rely on mobile phones, computers and other equipment, bad for eyes, fast learning and forgetting, and not conducive to teacher-student communication. More than half of the students hope that teachers can use a blended mode when the epidemic ends.

As far as the research results are concerned, online learning will not replace traditional teaching temporarily. The results indicate the potential of online learning has not been fully explored, and the main problems are concentrated in four aspects. The teacher's own role positioning is unclear, and teaching concept change is not enough. Some students do not have a strong sense of self-efficacy and the learning effect is not good. Quite a few students rely too much on the guidance and help of teachers, and lack of independent learning ability (Wu, 2021).

Gallego-Gómez et. al. (2021) collected the data from students at public and private Spanish universities by conducting online survey to test the hypothesized

relationships among attitude, advantages of use, intent of use, satisfaction, and utility and explore acceptance of online teaching and learning for universities students under the scenario of COVID-19.

Their study indicates that there are positive relationships between attitude and intention of use, attitude and perceived advantages, satisfaction and usefulness, satisfaction and attitude, and satisfaction and intention. The result also shows that more than one third students improved the view on online teaching and learning by online system experience during the pandemic. However, almost a half of students do not think online teaching and learning will be instead of face-to-face teaching and learning.

Students' satisfaction also reflects their attitudes on online learning during COVID-19. Maqableh et. al. (2021) who come from Jordan universities conducted twice online surveys distributing to 483 undergraduate students after the emergency shifting to online learning first and then 853 undergraduate students in Jordan who experienced online learn for three academic semesters. The study aimed to find the impact of changing from traditional face-to-face learning to online learning, The authors tried to illustrate both positive and negative influence of online learning. The results of the two surveys signaled that more than one third students are not satisfied with online learning.

The study also analyzed the reasons of those dissatisfaction through focus group. The results showed that the students cannot concentrate their attention on the class and online classes caused their psychological issues and time management problems. This paper also provided recommendation and solutions to improve online learning

experience and students' satisfactions on online learning. According to this study, it can be learned the advantages and disadvantages of online learning from undergraduate students' point of view and the undergraduate students' attitudes on online learning during COVID-19 pandemic.

Paechter and Maier (2010) tried to explore when do the students prefer online learning in higher education. They collected data from 2196 students of 29 Austrian universities through questionnaire when those students took an e-learning course. The students considered that online learning provides clear and organized learning material and information delivering that can help them regulated learning better. While they held that face-to-face learning is a good way for better communication and better understanding each other as well as good relationship establishing. The study results also pointed out that the students' preferences of online learning and face-to-face learning are relevant to their learning achievement. If the learning content is about acquiring conceptual knowledge or application skills, the students prefer have face-to-face class. If the knowledge or skill can acquire by self-regulated, the students prefer have online class. This article presented students' preferences on online learning and face-to-face learning in higher education.

Beside online learning and face-to-face learning, students' attitudes on blended learning also aroused researchers' attention. Xu (2021) collected data through questionnaire based on Community of Inquiry theory and conducts experiment to confirm the results of the questionnaire analysis for investigation and optimization on online and offline blended learning of higher vocational English in Jinhua Polytechnic

of China. The research indicates that online, offline, and blended learning can improve enthusiasm of students and communication between teachers and students. The research also shows that the blended learning can have a certain effect on improving English performance of vocation students. The author finds that the students with high scores are more suitable to blended learning than those students with lower scores.

Differently, some researchers' studies result showed students' different attitudes on face-to-face learning and online learning. For example, Fisher & Baird (2005) carried out quantitative research to explore the students' attitude on blended learn via survey. They collected the quantitative data from 149 students who were studying at three Canadian community colleges. The research results shows that some students are satisfied with the blended learning design. The students gave 19 positive comments on blended learning. They hold that the teachers help them outside of classes and the online recourses provided by their teachers are great and very useful. However, more than 90% students dressed the importance of face-to-face learning which can meet their needs. They hold that face-to-face learning are very important on face-to-face feedback and especially on supervision and encouragement that are provided by their teachers.

Zhu et. al. (2020) collected data from 94 university students to discuss the students' attitudes on online learning and experience in a blended learning course. The researchers examined the changes in participants' attitudes toward online learning, as well as their ability of self-study, online interactions, and online learning intentions. Their research discussed the strategies of future online course design from the

perspective of improving students' self-study or self-learning ability. The study aims to investigate how college students' online learning experiences in a blended learning course will shape their intention to continue their online learning. The results showed 80% of the participants holding positive attitude toward online learning. The findings also indicated that when the blended courses ended, the participants' attitudes toward online learning are significantly increased.

Fang et. al. (2021) took university students in Tianjin as samples and collected data by randomly sending questionnaires online to study their satisfaction with blended learning. A total of 223 questionnaires are sent out, 223 are collected, and the collected questionnaires are sorted out and screened one by one. The final effective questionnaires are 203 with effective recovery rate of 91%. The respondents cover different genders and grades, and the questionnaire is representative.

Combining theoretical analysis with empirical analysis, this study proposes a model of students' satisfaction with blended learning, verified the model hypothesis through multiple linear regression model, and better explains the influence mechanism of blended learning satisfaction. The empirical results show that learning environment, learning effect, learning mode and learning resources all have positive influences on blended learning, and learning effect has the greatest positive influence on blended learning among them.

Therefore, learning effect is an important factor of blended learning satisfaction. However, the current learning effect of undergraduates is not very ideal, mainly because of class desertion, addiction to the Internet, resulting in a very low-class

attendance rate of most students. Because the content taught by teachers is too boring to arouse the resonance of students. In addition, the study also mentioned that in order to improve blended learning satisfaction, universities must improve learning environment and learning resources.

Wang et. al. (2022) explores the acceptance of blended learning for undergraduate through the questionnaire survey and put forward corresponding countermeasures The questionnaire includes two parts. The first is about the personal information of respondents, including control of spare time, basic attitude towards learning, subjective evaluation of the effect of blended mode classes during epidemic period, investment time, etc., which is used to understand the situation of students' independent learning after class, students' learning attitude, to judge whether blended learning affects learning quality.

The second part is the connection between online and offline knowledge, students' autonomous learning, the interaction under blended learning, influence of surrounding environment on blended learning, and students' personal emotional input, so as to further understand blended mode. The survey samples were consistent with the overall characteristics of students.

The results show that blended learning still has many drawbacks, such as difficult to guarantee teaching effect, difficult to supervise and so on. According to the collected questionnaires, the self-restraint ability of most students still needs to be improved. Most students still hold optimistic or average attitude towards blended learning, while only a few students hold extremely negative attitude.

Blended learning also presents many problems. For example, students do not have strong subjective initiative for learning and do not understand the nature of blended mode. From students' perspectives blended mode learning is not highly related to the examination, and rarely can truly apply what they have learned. For online learning, it is not easy to supervise students for teachers, and phenomenon of inactive discussion and skipping class occurs now and then, and universities informatization conditions are not perfect.

The solutions include standardizing students' learning attitude, perfecting the teaching management system and carrying out standardized education, promoting students to improve their self-discipline level, and helping students to form good living habits. Education and training can improve teachers' blended teaching level, and reasonably arrange teaching progress, and help students significantly improve learning effect. The online learning platform provides more functions to support interactive learning feedback and communication, and strengthens the reliability of the system to ensure blended learning progress proceeded smoothly. The conclusions can effectively help educators explore and optimize blended learning design, improve learner satisfaction, and improve the quality of blended learning (Wang et. al. ,2022).

Tang & Yang (2022) design questionnaire to objectively understand a university of Hebei province of China students' views on the blended learning mode and put forward the corresponding suggestions. 251 questionnaires are collected. The questionnaire data shows that most of students agree with the blended mode think that the blended mode can stimulate their enthusiasm on learning. Students like the teachers

to use online system in class to sign in, and use the system in online class to answer and discuss topics, and cooperate with voting, selection and other modules to bring novelty to the traditional classroom.

When conducting blended mode, teachers will put micro lessons or videos into the online teaching system in advance, and place teaching courseware. These teaching and learning contents can be helpful for students to supplement students, and allow students to preview knowledge points in advance, consolidate what they have learned in class, stimulate learning interest and support independent learning. The mobile library provided in the online teaching software can also expand students' knowledge.

However, for the micro lessons or videos provided by the teachers, most of the students choose to watch them carefully and watch the parts they do not understand again and again, but a very small number of students choose not to preview or review. The researchers put online learning on the online platform as part of the final grade. Most students accept online examination. However, there are also a very small part of students choose not to accept.

Tang & Yang (2022) believes that before implementing the blended learning mode, students should be given simple training on the online learning system, because some students are not familiar with the operation of online learning platform. Students should have their own choices for the ideal blended learning class. The most popular choice is teachers' teaching with more in-depth content, which shows that even in the blended learning mode, students still think teachers' teaching is very important. There are also some students choose to focus on student discussion, and teachers guide beside

them, which also reflects students' attention to classroom discussion. The students rated the blended mode, and most students chose the score of 60-70, indicating that the teachers only did a passing grade.

According to the questionnaire survey on blended learning of undergraduates in Anhui University of Technology during the 2020-2021 academic year, Zou et. al. (2022) explored how to improve the teaching effect of blended learning from students' perspectives. 8644 valid questionnaires were obtained in all. Grades distribution of students participating in the questionnaire is concentrated in the freshman to the junior year. University students are the objects served by universities, and their satisfaction with learning results is the most direct evaluation of their perception of learning experience and growth and harvest of various abilities after their participation in higher education, which can objectively reflect the quality of education and teaching.

The finding indicated that students who are dissatisfied with the blended learning only accounts for 1.82%. This shows that most students confirm the value of teachers blended teaching methods and quality of online and face-to-face learning. More than 15% students are not satisfied with blended mode.

The research findings show five indicators of teachers' teaching affect students learning effect. The five indicators are the connection content of blended learning, interaction, online resources provided by teachers, proficiency of blended learning mode, and after-class question-and-answer. The research data shows that the level of connection of blended learning, interaction among teachers and students, resources provided by teachers, and the proficiency of blended learning mode are positively

correlated with students' after-school learning time, that affects enthusiasm of students' learning (Zou, 2022).

Because of uneven quality of learning content pushed online, some public teaching videos are vivid, but they cannot teach students according to different students' needs. Some teachers even just read PPT, students are easy to produce resistance psychology. Obviously, the teaching effect of simple blended mode definitely presents not to be satisfactory. Teachers can rationally arrange online resources and properly connect online and offline teaching contents through three steps: online knowledge warmup, teaching face-to-face for key and difficult points, and online for knowledge consolidation and broadening.

Online knowledge warmup mainly achieves the purpose that students have an overall understanding of the content to be learned, including learning objectives, content modules, functions in the chapter, connections with other knowledge and practical applications. It should be noted that appropriate online quality course resources should be selected according to students' basic knowledge. Teachers should record the professional basic knowledge of the courses by themselves. In addition, the warmup should also be matched with assessment, so that students can complete the teaching of this link with tasks, and pave the way for the following face-to-face learning of heavy and difficult points.

With online support and feedback from warmup, teachers take full advantage of 45 minutes class time, explain the key content in detail, analyze the difficult points in place, cultivate and train students' higher-level thinking ability, strengthen students'

ability to solve problems, so that students have the satisfaction of learning knowledge and the confidence to cope with the following tasks. After having a solid theoretical knowledge reserve and problem awareness, teachers need to provide follow-up online learning resources for students, echo face-to-face classroom learning, and further help students consolidate knowledge points and broaden their horizons. It includes electronic teaching materials, PPT courseware, audio and video explanation of difficult points and problems, and cases of practical application of knowledge (competition questions, applications in other disciplines, applications to solve practical problems and cutting-edge scientific and technological achievements).

On this basis, students are required to complete homework after class. The assignment of homework is not in quantity but in quality, and the assignment is mainly to cultivate students' exploration spirit, learning autonomy and innovation ability. It can be knowledge consolidation training, and it also can be perception, communication and problem-solving reports. During online knowledge consolidation and expansion stage, students can be guided online by means of online learning group discussion, learning experience exchange or learning results sharing.

While students are learning professional knowledge, students can promote mutual communication among students, cultivate students' sense of teamwork, and stimulate students' learning interest. As for proficiency of blended learning mode, both teachers and school authorities should pay attention to it in thought and implement it in action. Relevant departments of universities should organize more online course construction and operation training activities. Teachers can make reasonable arrangement of

teaching contents according to class conditions, timely grasp students' learning trends, better serve students and improve their learning effect (Zou et. al., 2022).

3.2 Online Learning

Online learning strategies should assist and allow learners to search the existing information from long term memory so that it could help the learners to understand new information deeply. The learners should construct the memory relationship between the new information and the relevant information that has been stored in long term memory (Ally, 2008).

Learners' existing cognitive structure should be activated and relevant information should be provided to learners for integrating the content of the whole class. Ausubel (1960) claims that the organizers could help the learners to review the knowledge they learned before and help them to integrating all the details of the class and process the information before the class. A study found that if the organizers provide the learning information framework for the learners, the online learning strategy is effective when the learning materials of the online learning courses is very new to the learners (Mayer,1979).

The online learning courses could propose concept models so that the learners could search existing psychological model or store the structure. All those could help the learners learn the details of the course. The teachers or instructors can apply instructional questions to build learning and teaching anticipated outcome. That could enliven existing knowledge of learners and encourage them to explore other learning

resources to achieve the course learning or teaching outcome. The preparatory test questions can be applied into informing with existing cognitive structure for learning new knowledge. Online learning is flexible. Different knowledge level of learners could select the best fit material for them (Ally, 2008).

Miller (1956) holds that the information should be divided into different parts so that it could avoid the information processed overloaded during the working memory processing. The online learning materials should be presented 5 to 9 items on screen for facilitating working memory processing effectively. If the teachers plan to instruct a great many items during one class time, the teachers should design information map through those items and present the information map on the screen. The information map generalizes the overview content of the online course.

As the course goes on, each item of information map will be presented comprehensively and each item will be broken up into many sub-items. When the online learning class or course is over, the comprehensive generalized information map will be presented again and the teacher should illustrate clearly the relationships among each item (Ally, 2008).

Bonk & Reynolds (1997) suggest that teachers should require learners to form their own information map when they are learning. After class, information map can facilitate the learners' processing learning information deeply. The information maps not only can promote the learners to process information deeply, but also it can provide big picture for learners' understanding the information in details. Online learning could apply computers to form information map. Teachers also are suggested learners to use

computer functions to present information map (Ally, 2008).

The other strategies of deeply processing information should be applied into transferring attribute. The information should be transferred into long-term memory. And the information should be stored in long-term memory. In order to transfer information effectively information into long term memory, the learners should be required to utilize the strategies that include applications, analysis, integration and evaluation to promote the higher-level learning. The online learning strategies are also required to apply learning information in real life which can facilitate situational learning and to process the information deeply (Ally, 2008).

Cassidy (2004) advocates that online teaching should include online learning strategy so that it could fit individual differences and different learning styles. Ally (2008) further explains that learning styles mean how the learners to perceive the learning environment, how the learners to interact with the learning environment and how the learners adapt to the surroundings for learning. Learners' differences can be measured by learning styles. Different learners' learning styles is determined by learning style tools.

According to learning style tools that Kolb (1984) proposed, learning experience is consist of two parts. One is perceiving, the other one is information processing. Perceiving means the mode that the learners perceive the surrounding information and reflection observation. In the process of reflection observation, the learners tend to prefer to process learning material deeply.

For other part of learning experience is information processing. The information

is perceived from the surrounding. Then the learners to understand it and process it. The range of processing procedure is from the abstract concepts to actively practice. The learners who prefer to abstract concepts tend to like numbers study and trying to different issues. For the learners who prefer to be initiative to practice more like to learn from life that they experienced The courses could learn and confirm preferences of learners so that the online learning courses and the teachers can provide appropriate learning activities according to learners' styles and to satisfy different learners' learning demands.

The type of reflection-observation learners will take actions after they observe seriously. They would like to apply all the observed information in their learning and the teachers are experts in their eyes. They tend not to interact with others. The type of abstract-conceptual learners prefers to facts and pictures, but not people. They more prefer to theories and analyzing the information and theories systematically.

The type of active-experience learners enjoys learning in practice, participating in different projects and discussion in the groups. They prefer active learning approach, interacting with peer and get feedback and information. They are apt to evaluate situations according to their own constructed assessment criteria. Online learning material should provide enough support for the learners who have different learning styles. The learners who have different learning styles need different preference support (Ally & Fahy, 2002). For example, the assimilative type learners prefer high presence of teachers or instructors; however, the accommodation type learners prefer low presence of teachers or instructors (Ally, 2008).

Cognitive mode means the learners' preference pattern to process information. In other words, it refers to an individual's emblematic mode to think, memorize or solve problems. Therefore, different learners have different cognitive style. Cognitive style reflects different personality. It can impact on learners' values, communications and attitudes. It is a personality dimension.

Witkin et. al. (1977) claims that one of dimension of cognitive style influence online learning. It lies in field-dependent and field-independent personalities. The field-dependent personalities utilize analysis approach to access to the environment. For example, they distinguish people from their background. The individual in field-dependent personalities experience events through more comprehensive and less differences approach.

Comparing with the field-dependent personalities, the field-independent personalities tend to be stronger socio-oriented. When the learners with the field-dependent personalities have inner motivation, the learners are more likely to study efficiently. Furthermore, the learners will be less influenced by social reinforcement under the above-mentioned situation, such as self-study (Ally, 2008).

The information should be presented through different way so that it could be processed and transferred as long memory. When the situation allows, coding should be encouraged through providing textual, oral and visual information. Paivio (1986) proposed dual-coding theory. According to the dual-coding theory, the information will be better processed through presenting different patterns (textual, oral and visual information) than single pattern (Ally, 2008).

The learners should have motivation to learn. For any material, if the learners don't have motivation to learn, they cannot master the knowledge. The import thing is to make learning drive within the learners. Motivation is from learners themselves. The motivation should not be from teachers, instructors or performance.

Malone (1981) suggests that online learning material designers should incentive the learners through intrinsic motivation (Ally, 2008). The ARCS model that Keller (1983) proposes is to motivate learners during learning process (Keller & Suzuki,1988).

According to the ARCS model, for attention, the course is required to catch the learners' attention at the very beginning of the class and keep the learners' attention during the whole course. The learning activities should be designed in the online learning material for constructing connection with the learners at the beginning of the online learning.

For relevance, the instructors or the teachers should tell the learner the importance of the course and how the learners could benefit from the course. The online learning strategy could describe how the learners can get benefit through learning the course and how the learners apply the knowledge of the course in practical situation. This strategy will be useful to contextual learning which is more meaningful so that the learners could keep learning interest throughout the online learning process.

For confidence, the online learning could utilize the strategy for designing success and let the learners know the expectation of the course. The online learning material could be design in sequence from simple to difficult, know to unknow. The instructors or the teachers could apply capability-based approach to guide and provide chances to

the learners using different strategies to finish the course. The teachers should tell the course expectations constantly. The learners should be encouraged to finish the whole course.

The instructors or the teachers provide learners' performance feedback to learners according to their performance. The teachers should encourage learners to apply the course knowledge into practical situations. Usually, the learners enjoy knowing what they are doing and learning and they like contextualizing what they learn in the course through applying them in real life (Ally, 2008).

Both Mayer (1998) and Sternberg (1998) propose that the learners should be encouraged to apply metacognitive skills to assist learning in learning process. Yorke and Knight (2004) also support the learners to apply metacognitive skills which could help the learners' learning. Metacognitive competence is a kind of ability that the learners realize their cognitive competences and the learners utilize those competences to learn. When the learners have their online course, the learners should have opportunities to reflect on the learning content that they learn in the class and cooperate with other learners so that they could check their progress. It is a good strategy that encourage the learners to self-check the problems and exercises through using the feedbacks so that the learners could know how they are learning. The learners' metacognition will be formed. They could use it to change methods for better learning. (Ally, 2008).

This learning strategies is to promote to transfer what the learning. It also encourages the learners to apply their learning in real life and different scenario. The

course should use real life cases and simulate real situations which should be the necessary part of the whole course. In addition, the instructors or the teachers should provide chances to learners finishing their assignments and learning projects by considering practical or real life situations. The process of transferring the learners' learning in real life or practical situations help the learner to develop their personal meaning and application in real life scenario (Ally & Anderson, 2008).

Cognitive psychology claims that the leaners learn and accept information. Then they change the information into long-term memory and store it there. The amount of processing information is determined by how much information the learners perceive from the surrounding. If working memory has higher quality information processing, the more information will be stored in long-term memory. The effective online leaning strategies must utilize technology to help the learner to feel. The strategies also should include advanced processing parts to promote information transferring. That could help the information be stored in long-term memory. After the learners acquire the information, they generate and form their own person knowledge and make the online learning material more meaningful (Ally & Anderson, 2008).

The constructivist school of learning also impact online learning theory a lot. The theory of constructivist believes that the learners is active to learn and is not passive to learn. The constructivist claims that the knowledge is not from the outside and is also not from others.

On the contrary, individual learner generate knowledge through interpreting and processing the received information that the learner senses. The learners are the main

role for the learning. Teachers should give advices and encourage the learners. The learners should form their own knowledge structure. They should not only acquire knowledge from the teachers' teaching.

Hung et. al. (2004) holds the view that the key important thing of the theory of constructivist is scenario learning. The theory of constructivist believes that learning is the same as context of situation. Online teaching courses should include the learning activities that integrate the contextualized information by the learners. Tapscott (1998) indicates that multiple contexts is the necessity for information application. Then facilitating multiple contexts learning strategies could be adopted to guarantee the learner indeed applying information broadly. Learning is turning from single-track teaching or instruction to knowledge construction and discovery.

Transformation theory utilizes constructive and cognitive theories to interpret how people to learn (Mezirow, 1991). Mezirow believes that learning is the process of applying previous interpretation to analyze a brand new and revised the meaning of one's own experience and so that it could guide the future behavior. Mezirow proposed that transformation learning reflectively include changing include changing believes, attitudes, ideas, emotion reactions which is consist of our blue print or changing our point of views. Mezirow suggests that learning involves five interaction background and they are learning embedding reference or significant point of view, communication condition, action rout or process of learning happens, learners' self-image as well as situations that may encounter during learning progress. Ally also lists the implications on online learning that is from constructive theory.

Learning process should be an active process. Arranging the learners to do something positive and meaningful can help the learners produce high level information processing which is helpful to have personalized meaning for learners. It is a positive process for learners if the learners are required to put the learned knowledge into practice. It can contribute to personal meaning and associated personal relevant things. The learners should form their own knowledge structure. They should not only accept knowledge from their teachers (Ally & Anderson, 2008).

Hooper & Hannafin (1991) claims that cooperation is very important. Cooperation and cooperative learning could facilitate constructivist learning. Cooperation could provide teamwork and allow the learners apply their metacognition and skills. And the learners also could learn from others' advantages. The assignment is allocated according to professional differences. Each group could benefit from others' advantages.

The learners should grasp the whole process of learning. There should be a form of teaching with instructors' guidance that guide the learners making a decision about learning goals. The learners should be given time and chances for reflection because the learners need time to reflect the information. The whole class could be encouraged to think through meaningful relevant activities. They also could be encouraged to reflection and process the information deeply. The learning process should become meaningful. That could help the learners understand information well. Learning is new knowledge, skill and attitude development of the learners interact with the learning environment (Russell. et. al, 2002).

According to Murphy & Cifuentes (2001), interaction is the key important for online learning learners forming sense of community. That could promote transformational learning. During learning process, the information is contextualized and personalized. During the process of transformation, the learners apply the knowledge that they learned. Educational experience designing includes the teachers or instructors, learners and the transactional nature with important meaningful content to learning experience Garrison (1999). Different interaction can promote different levels of learning. According to Berge (1999), Gilbert & Moore (1998) and Schwier & Misanchuk (1993), the following FIGURE 1. Levels of Interaction in online learning chart shows promoting higher level interactive strategy,

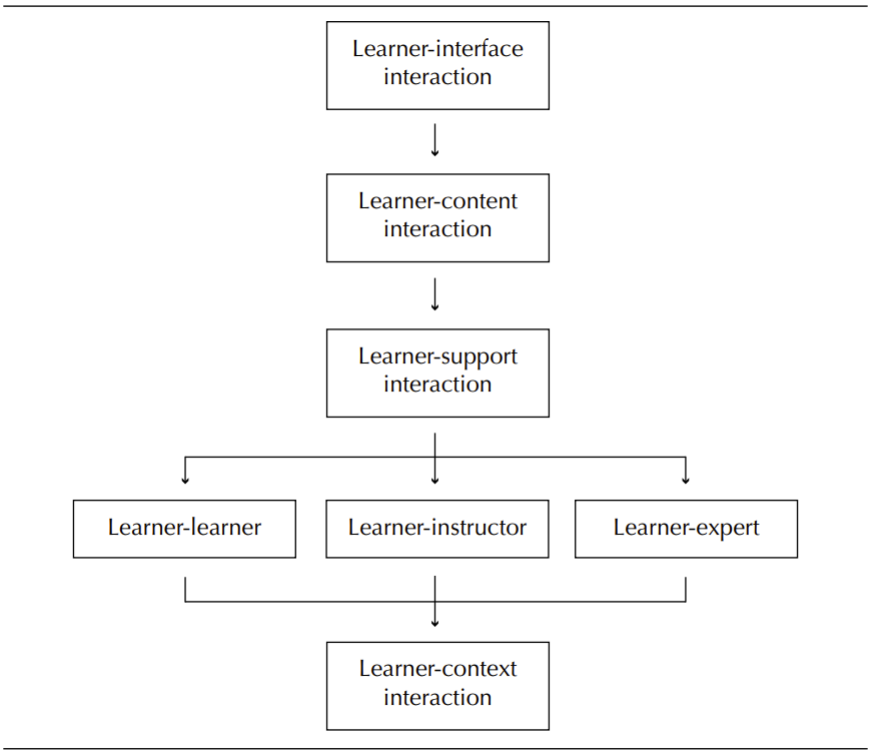

FIGURE 1. Levels of Interaction in online learning

An interactive online learning framework can be consisted of three levels (Hirumi, 2002). The first level is the learners themselves interacting which happens within the

learners so that it could help the learners supervise and adjust their own learning. The second level is the learners interacting with human beings and the learners interacting with non-human beings. The third level is the learners interacting with the teachers or the instructors which consist of the actives which is of learning achievement realization. The impaction of constructivist school of learning theory on online learning proposes and explains the interaction based on the behaviorist, cognitivist, and constructivist theories.

Lower-level interaction could allow the learners to be access to the information and sense the information. The learners access the courses consisted parts through browsing the content. Those courses consisted parts could adopt pre-learning, learning and post learning activities (Wiley, 2002). Or the course designers or instructors could create customized content for the learners and the learners could use them. The learners should be allowed to possess the ability of choosing the sequence of learning or given the advices on choosing one or more choices of the sequence of learning.

According to Moore (1989), when the learners learn the content, they will find that they need supports. According to Rourke. et. al (2001), the supports include the interaction forms of learners to the learners, the learners to the teachers or instructors, the teachers or instructors to the learners as well as the learners to the experts. There should have some strategies to promote the interaction between the learners and the context which could help the learners learn better. The interaction between the learners and the context can make the learners develop their individual knowledge. It also can help construct individual meaning according to the information (Ally & Anderson,

2008).

Connectivism theory also impacts online learning. Connectivism theory is for the individual learning and work in digital era and internet environment. Therefore, people cannot control what they learn because the internet change the information continually which require to learn new and forget the old information as well as learn the current information (Siemens, 2004).

Siemens (2004) proposed many learning materials designing guidance directions for the learners which bases on connectivism theory. In this information explosion era, the learners process and study the present information. The future leaners must learn autonomously and independently. They could access knowledge. They also could construct accurate and effective knowledge data base. They use internet to learn properly. Because of the continuous changing, some knowledge and information will be out of date.

The learners must forget the old knowledge and old thinking models. They have to accept new information and new thinking mode. Old information is not valid any more so that they could access new knowledge of a subject that requires the learners to keep the latest information of the field and become active participants of network learning (Ally & Anderson, 2008).

Due to globalization, the information is not only used for confirming geographical location. With the internet using wildly and increasingly, the experts and learners of all over the world could share and review the information. Therefore, people all over the world should be connected and study others' opinions as well as share their ideas

with the whole world. According to Ally (2005), mobile learning is expected to help the learners playing a role in the internet world and they could learn at any time and in any place.

According to Mukhopadhyay & Parhar (2001), the world is connected through telecommunications technology. Hence, the learning information should not be from only one source but come together from many different sources. Learning could proceed through multiple ways and provide learning materials through different telecommunications technologies in order to promote optimal learning. Computer systems field is changing the learning process. The intelligent agents which is internally installed in equipment and motors will affect students' learning style and accessing to learning materials approach nowadays. For example, the equipment and motors will internally install different learning materials. The learners will be trained how to interact with equipment. If learners use equipment in a wrong way, the system will give errors warning and offer correct operation information. Therefore, the type of the equipment that the learners use and the learners' previously learned knowledge determine what the learners need to learn (Ally & Anderson, 2008).

According to Schmidt & Werner (2007), due to explosion of information, the learners have to update knowledge continuously in the future. Online teaching strategies must allow the leaners to have opportunities to study and locate new information of subjects so that it could guarantee they grasp the latest fields.

Therefore, the learners have to connect with others for establishing network. They could update their knowledge constantly through that network. With innovation further

development, information becomes multidisciplinary. Learners have to understand many disciplinaries. They also have to find the relationship among different fields information. For example, the learners of learning theories should learn the research achievements of psychology and information technologies (Ally & Anderson, 2008).

Because of the changing of internet society, globalization, information and new information, the educator should find new approach of learning materials designing (Siemens,2004). In order to help the learners be ready for this digital and internet era, Siemens (2004) proposes a theory based on connective theory which still need to be studied further for teaching designing and making learning materials.

According to all the educational theories, it can be concluded that a model based on education theories can be proposed. That model shows the important components of learning which is used for designing online learning materials. Online learning instruction does not mean that placing information on the website or any links for accessing to any digital resources.

According to Ally (2008), for learner preparation, different kinds of activities can help the learners be ready for the classes' details, associate and stimulate them to learn online courses. A basic theory should be show for the learners so that the learners could know the importance of participating in online learning and let them know how they could benefit from it. Providing concept map for constructing the existing cognition and integrating the details of online courses so that the learners' existing cognition could be activated which could help them learn the online learning course details.

The learners should know the course learning outcome so that they could know

what it the expectation of them and they could measure when they achieve those course outcomes. An organizer is needed. And the organizer should construct and design a plan. The organizer should plan online course details. The organizer also should build a connection to make the learners clear about what they have known and what they need know. The teachers should let the learners clear on the what requirements they need to reach to before online course starts. Through that process, the learners will well know themselves whether to be ready for the online course or not. The prerequisite requirements that are provided to the learners could activate their current cognition mode. After that, the learners will easy to learn online course materials. The concept map also provides a big picture for the learners.

Before the course starts, assessment will be arranged for the learners. Through the assessment, both the teachers and the learners could well know how much knowledge the learners learned and how well the learners grasp skills they learned through the online course. If the learners believe that they have already master well all those mentioned in the assessment, the learners will get approval for participating course final examination. Assessment can help the learners recall and consoled the knowledge they learned in the online course. It also helps the learners recognize the key points of learning materials. When the learners are familiar with the course details, they could continue to learn and complete the online learning course (Ally & Anderson, 2008).

For learner activities, Ally (2008) claims that online learning should include all kinds of activities in order to help the leaners achieve learning outcomes and meet

individual learning needs. For example, the learning activities could include different forms, such as reading textual material, listen to audio learning material and watch visual and video materials. The learners could study on the website or link to the online information or library for requiring further information. The learners should be required to write essays which can facilitate knowledge application ability. That also could help the learners reflect what they learn. During that process, they will form their own knowledge structure. Properly applying exercise which should be embed throughout the whole course in order to construct knowledge system. Feedback will be given to the learners in time which could help the learners monitor their performance in order to adjust their learner methods necessarily. In order to process higher level and facilitate the closure of the course, the teachers will arrange paper writing as assignment for the learners. The learners should submit the paper according to the required time. Usually, the paper writing is a form of summary on the online course.

Besides the influence of education theory on online learning, more and more practical researches are proceeded by researchers and scholars. Ouma (2021), a Director, Quality Assurance and Lecturer at Uganda Martyrs University, collects and uses data from the online teaching and learning academic staff and students at Uganda Martyrs University through In-depth interviews and focus groups during COVID-19 pandemic to explore the benefits and challenges of online teaching and learning during the Covid-19 pandemic in Ugandan Universities. The author find online learning is a flexible learning mode and no matter where the students live the students can

participate learning at any time and any place without hinder from mobility. Online learning also can meet different interests and needs of students and teachers. At the same time, the universities also should consider to offer reliable internet infrastructure, internet skills training and financial support to access to online learning and teaching for both students and teachers as well as including the disadvantaged.

The researchers who are from University of Augsburg and University of Mannheim of Germany, analyzed online learning achievement goals of 80 lecturer at Germany University and online teaching quality being from 703 student at the same University during COVID-19 pandemic. This paper implied that the lecturers assumed the online learning is a kind of threaten on their performance and achievement when they have to accept the changes from face-to face to online during the sudden COVID-19 pandemic at the very beginning. The paper call that as performance avoidance and work avoidance. However, with the starting of online learning, the lecturers turn the negative threaten into positive challenge and the lecturers took this opportunity as a chance of promoting their working competence. They positively prepared for the classes via digital and online teaching tools. And their effort successfully proved that online learning can accomplished their achievement goals. At the same time, the survey on teaching quality of 703 student is negative relevance to performance avoidance and work avoidance goals. This paper result indicates that the relevance of lecturers' attitude and goals in higher education for successful online learning. It also provided a successful online leaning data sample in higher education (Daumille. et. al, 2021).

Online teaching and learning environment are also very important. Kabilan et. al. (2010) wrote an article that is aimed to investigate if the Facebook is a useful and meaningful learning environment to enhance or strength English skills for university students. The authors took a survey to introduce questionnaire to 300 undergraduate students at University of Sains Malaysia (USM), Penang. The result is that the general opinions of the students are agreed Facebook can be an online learning environment to facilitate English language learning in terms of students' improvement of language skills and motivation, and attitudes towards English language learning. Otherwise less than 10% students disagree that the Facebook can be effective environment for English learning. Facebook does not help in enhancing one's English language skills, because it Is only platform for socializing and information or stories sharing. The authors consider that if Facebook is planed appropriately as a part of incidental educational project, It would be able to facilitate and produce effectual and meaningful learning of English. From this paper, Facebook as an online learning tool, it can be concluded that online learning plays an active role in university students learning.

Online teaching and learning have to face some challenges. Ulla & Perales (2021) discussed about online teaching and learning challenges during emergency online teaching and learning arrangement COVID-19. The authors collected qualitative data from 6 university teachers in a Thailand University through a method of online interview individually as a convenient sample purposively. The results showed that online teaching and learning lacks of interaction between teacher and students and the teachers do not have time to make assessment and feedback.

At the same time, it is hard to get the students' concentration for online teaching and learning. Those issues are the challenges that the teachers have to face. Though the teachers encountered many challenges when the teaching and learning was changed from face-to-face to online, they still kept a positive attitude. They believed that online teaching and learning is the best way for avoiding virus infection and guaranteeing safety of both teachers and students.

Besides challenges, the teachers all agreed that online teaching and learning also brought positive aspects. the teachers admitted that online teaching and learning is a whole new experience and they learned a lot from this experience. Their competences are greatly improved and became creative and skillful so that they could deliver the online class effectively. This paper also pointed that the teaching and learning should not be constrained in classroom only. It also gave a signal that online teaching and learning can offer a method to support to continuous learning during crisis time necessarily.

Ballad and his fellows, who are from three nursing universities in Oman, holds a view that online learning requires the students having high self-motivation and self-direction to learn during the emergent COVID-19 pandemic. They did a study in order to explore the relationship between self-directed learning and student learning styles. The data of this study were from 236 Omani nursing students. They collected data through online questionnaire, The study indicated that the learners who are perceptive, solitary, competitive, or imaginative tend to have high degree self-directed learning. According to this study result, the study also suggested that the university or the

teachers should make different thoughtful planning and strategies to meet the academic learning demands of different student learning styles. This study results can be as one of reference resources for online teaching and learning policy making in universities in order to implement effective online teaching and learning strategies.

The effectiveness of online learning should be considered. Wong et. al. (2022) carried out research on effectiveness of E-Service-Learning on Hong Kong university students during COVID-19. They collected data from two different cohorts of a Hong Kong University and applied blended methods to explore the differences of effectiveness between face-to-face learning and Furthermore under the same conditions of same teachers, same courses and same assessment standards, etc. The research findings showed that there are no significant differences between face-to-face learning and E-Service-Learning on students' developmental outcomes. Furthermore, E-Service-Learning showed easier to get satisfaction from students and enhance students' performance than face-to-face learning. In addition, this study also pointed out that students with regular reflection tend to get better learning.

3.3 Blended Learning

Blended Learning is a word that first appears and is frequently used in the field of corporate training through reflection on online learning. Corporate training is different from traditional school education. The main purpose of corporate training is to improve business profits. The purpose of training in business is not primarily to make employees smarter but to make the business more profitable with less investment.

More and more people gradually explore the use of classroom teaching, group discussion, special discussion and online distance teaching methods.

In 1964, Marshall Mcluhan, a Canadian scholar, demonstrated in his book General Theory of Media: The Extension of Human Body that human beings have put forward many new concepts on the nature, characteristics, functions and classification of media while entering the electronic age.

One of the important viewpoints is that media is the extension of human body. For example, radio broadcasting and public address system equivalent to the extension of the ear. The camera and video camera are an extension of vision. Movies and television are an extension of sight and hearing. The information storage function of video recorder and tape recorder, the logic operation function of computer is equivalent to the extension of human brain. The nature of media is an extension of human body has brought many influences on education. The extension of media enlarges and enhances people's sense and thinking ability. The extension of the media disrupts the balance of the senses and elevates one sensory organ over another. The extension of media means that the function of media is complementary because of the different extension directions of various media.

Therefore, any media has its strengths and weaknesses. Media can complement each other, but rarely replace each other. Therefore, there is no universal media. The extension of media also promotes the development of media itself to the depth and breadth. The mutual promotion between media forces media to constantly change the form to extend deeper and wider in order to survive. For example, the development of

television from analog television to digital direction, network transmission of information from hypertext to hypermedia, streaming media direction, the extension ability to deeper and broader direction.

In 1954, W. Schramm's, a famous American communication scientist, proposed the law of media selection, which is used to analyze the basis law affecting human's behavior in choosing to contact or use media. The law can be expressed as following,

Expected choice probability = Potential reward/ The price needs to pay

The cost to be paid here includes the cost required for media production (equipment loss, material cost, personnel cost, etc.) and the effort (difficulty, time spent, etc.) collectively referred to as the cost. The possible remuneration refers to the degree to which the teaching objectives can be accomplished, that is, how much new knowledge students can obtain through the media, whether the effect of ability cultivation can be achieved and other factors (Li, 2004). The formula indicates that the smaller the cost to pay and the greater the possible reward, the higher the probability of media's expected choice. The inspiration from the law of media selection is that media selection and use should aim at increasing the ratio of reward to cost. Blended learning is the expectation of maximum reward at minimum cost. The following approaches can be adopted in the design of blended learning schemes:

A. Teaching efficiency remains unchanged and costs are reduced as far as possible;

B. Keep the cost unchanged and maximize the efficiency;

C. Try to reduce costs and improve efficiency;

D. The cost is slightly increased, and the efficiency is greatly improved;

E. The efficiency is slightly reduced, but the cost is greatly reduced (Li, 2004).

In the application of ERP which is called European Recovery Plan training in Europe, many companies have designed a blended mode plan. That education plan includes different topics. Those topics usually can lead different education ideas. And European Recovery Plan (ERP) can be expressed as following,

Teacher-led instruction or teleconferencing → Self-learning network courseware or online programs → Teacher-led exercise or evaluation

According to the transmission channels of learning, it can be found that the representative transmission channels mainly include classrooms, virtual classrooms, web-based courses, print, CD, video, email, telephone, coaches and tutors, electronic performance systems (EPSS), software simulation, online cooperation, personalized e-Learning and knowledge database management channels.

In addition, many researches do not only focus on mobile channel, but also focus on wireless channel. Those researches are mainly in education technology field. However, what blended learning focuses on is not only the technical channel, but also focuses on the information transmission channel. Transmission channel is always about learning process. Blended learning includes two basic channels and they are online and face-to-face learning, but face-to-face mode can be divided into formal and informal, technique-based or participant-based, instruction-based and discovery-based in lead-subject activities, and so on (Li, 2004).

The key to blended learning is the choice and combination of media. Blended learning is an important new concept formed on the basis of the reflection of online

learning. Blended learning tries to find a way of learning that can not only give full play to online learning advantages, but also obtain the highest learning efficiency and the lowest investment. Blended learning tries to find out unique and effective ways to solve specific teaching problems by selecting appropriate media, so as to adjust the use of online learning in the most appropriate place, and solve the coordination problem of speed, scale and effect. Therefore, the key to blended learning is to follow W Schramm's law of media selection, namely the minimum cost and maximum value rate, and select and combine media appropriately. Then it could use the lowest possible cost and obtain the highest learning efficiency (Li, 2004).

Gao (2010) also holds that blended learning theory originates from media which is an extension of the human body. W. Schramm’s formula indicates that the smaller the cost to pay and the greater the possible reward, the higher the expected selection probability of media. An inspiration can be drawed from media selection that the selection and use of media should aim at increasing the ratio between reward and cost. Blended learning is the expectation of maximum reward at minimum cost.

According to blended learning basic principle, blended learning consists of online and face-to-face learning modes. It can be described like that way simply. According to existing theories, blended learning can be seen as the organic combination of online learning mode and face-to-face learning mode. It is also a blended of different teaching concepts, a blended of teacher leading role and student main participation, two different learning environments blended that are traditional classroom learning and online learning, a blended of different learning information communication medias, a

blended of classroom language direct communication and virtual voice indirect transmission. It is not only a blended of teaching methods but also teaching techniques for better learning effect.

The basic principle of blended learning mainly reflects the following characteristics. Firstly, teachers' leading role and students' dominant role are combined in blended learning class. Its purpose is to give full play to enthusiasm of both teachers and students. It avoids both teachers and students to play their role passively. The second characteristics is the different choice of teaching information transmission channel. The information transmitted from different information sources is transmitted to the audience through different channels. The third is the reasonable selection and collocation of teaching media. The reasonable collocation of media will promote the further improvement of the learning effect (i.e., the remuneration) and the effective reduction of the cost. Blended learning has the mentioned characteristics. It pays attention to teaching information transfer channel research. It pays attention to the reasonable choice of media to achieve the optimal combination of teaching media as well.

The blended learning process consists of four basic steps. Firstly, to make sure and define learning needs. Students' learning needs are diverse. Secondly, to design learning plans and evaluation strategies according to features of learners. Thirdly, to implement learning plan, to observe the whole process and evaluate outcomes.

According to above mentioned, Professor Li Kedong from South China Normal University decomposed blended learning design into eight cyclic links. Firstly, he

holds that the first step should determine learning goal. The second step should make sure the expected performance. The third step is to choose transmission channel and media; The fourth is to learn design and the fifth is to support strategy. He claims the sixth step should track the plan implementation process. The seventh step is to evaluate learning results. The last one is to revise learning.

Gao (2010) indicates that, blended learning applications of adult education is more targeted and relevant than that in general education, and the effect will be more obvious through the above analysis. Because applying blended learning principle to reform and construct adult education teaching operation mode can not only overcome the drawbacks of traditional teaching operation mode but also avoid the phenomenon that violates the law of talent training, such as the isolation between teachers and students simply caused by distance education (Gao, 2010).

Song and Yan (2020) hold that blended teaching evaluation mainly influence academic research. Some scholars divide the evaluation system into three levels and they are cognitive level, cooperation and social knowledge construction, and emotional attitude. At present, no matter elementary education, secondary education, higher education and vocational education, blended teaching has achieved obvious results in stimulating students' enthusiasm for learning, balancing educational resources, improving attendance and passing rate, improving students' learning efficiency, enhancing independent learning ability and improving cooperation ability (Song & Yao, 2020).

According to Li & Zhao (2004), blended learning is a new term formed on the

basis of the reflection of online learning. It has appeared in the field of educational technology for a short time. However, for its meaning, it has indeed existed longer time. Its significance lies in blended learning essence focuses on the selection of information transmission channels, and focuses on how to select information channels according to the principle of low investment and high efficiency. Therefore, blended learning can be said to be a return of learning concept.

Wong et.al. (2022) proposed that higher education innovation, blended teaching and learning breaks through the singleness and teacher-orientation of traditional teaching methods, and comprehensively uses different learning theories, techniques and means to implement teaching activities. Blended teaching and learning emphasize giving full play to various resources and means to achieve better learning results and teaching objectives.

However, the current blended mode learning is short of efficient educational concept guidance. The evaluation system of teaching and learning effect is not perfect. It is just of learning methods alternations. Outcome based education (OBE) teaching concept is adopted as the purpose, that is, output-oriented teaching and learning thinking, that focus on realizing learners' expected learning outcomes as the goal in the teaching process, and students' output-oriented teaching structure and curriculum are regarded as means rather than ends or purposes.

Zhou (2022) argues that blended learning is not an addition of two learning forms simply, but a deep integration based on educational informatization, which has advantaged that other learning modes do not have.

First of all, blended learning meets the significant requirements of educational modernization. To change the traditional learning mode through modern science and technology is also a breakthrough to the traditional learning concept, model, way and other aspects, in line with the concept of informatization. The outstanding performance of blended mode mainly lies in the two aspects of learning objectives and learning quality. In terms of learning objectives, more attention is paid to the student-oriented educational thought. Through the setting of curriculum plans, students gradually become a perfect person and achieve the corresponding teaching objectives.

Blended learning should highlight diversified demands, clarify the important direction of student initiative and teacher guidance, pay more attention to the teaching activities with student autonomy as the side in actual teaching activities, carefully design online courses, and integrate the student-oriented concept into all levels of online learning through online discussion and schoolwork. Blended learning should also have the excellence of teaching quality, that is, curriculum quality and student main value meet the planning requirements.

In terms of curriculum quality, it should meet the basic requirements stipulated by country, and meet the hard principles stipulated by the direct department, which is the common standard to judge blended mode effectiveness. For aspect of learners' main value, the student-oriented thought should be adhered to, analyze the distance between students' learning status and expected value, make up the gap, satisfy the demands of the society in construction, and realize expectations of families for their children and the needs of students' own long-term development. High-quality

diversified courses should gradually complete students' skills, values and thinking activities, and complete the transition from university to society.

Secondly, blended learning highlights the uniqueness of teaching content and the mutual subjectivity. Blended mode shows new extension of traditional curriculum in the new era. The uniqueness and innovation of teaching content focus on sorting out old and new ideas, that is, updating knowledge, concepts and cases. Therefore, it avoids occurrence of outdated experience that students cannot use the original experience to deal with new things and new problems.

Only by allowing students to grasp the context of knowledge innovation and development, can education reach to effective education. Not only that, the curriculum arrangement should focus on innovative expansion. The common subjectivity means to dilute or even eliminate the identities of teachers as imparts and students as recipients. Therefore, teachers' guidance and learners' participation are important in class. The subjectivities are in practical teaching, theoretical interaction and information sharing.

In the interactive process, teaching forms can be enriched and students' ability to actively construct knowledge can be cultivated. Teaching evaluation standards should focus on integration, the accuracy on teaching evaluation can realize first-class establishment. Teaching evaluation can be divided into two modules. First, teaching curriculum setting and objectives are carried out by front-line teachers and academic experts. In the discussion of setting up, front-line teachers should conduct self-reflection on the teaching content they have developed to a certain extent, and

determine the next modification plan through thinking. Second, the effectiveness of teaching courses and teaching objectives should be evaluated jointly, which reflects the important position of learners as subject of teaching (Zhou, 2022).

According to Zhou (2022), there are also dilemmas in blended learning. Blended learning mode should pay attention to the formation of deep, difficult and challenging mode, which is the so-called construction of new and highly operable teaching mode. However, there are some deviations in the current student training programs, different teaching and learning methods and different emphasis on the integrated teaching and learning model. Therefore, it has various challenges in practice.

Zhou (2022) holds that blended mode model is difficult to implement. At present, there are more detailed directions for the research and program of mixed teaching mode, but the implementation situation of major universities is quite different. It is mainly reflected in the unreasonable setting of subject content and the evolution of traditional knowledge structure under the background of network education.

For subject content, the textbooks selected by universities and their emphasis angles are not uniform, which makes it impossible to achieve the formal consistency of teaching organization and management. Some universities do not pay attention to the blended learning mode, leading to the blended mode has been in theories and practice, unable to deepen and improve through many activities.

Under guidance of the new educational concept of Internet + education, information obtaining ways and information update are fragmented and instantaneous. The knowledge system changes with each passing day to promote frontier teachers to

innovate quickly, so that teachers can not elaborate curriculum connotation, fall into the embarrassing situation of marginalization information processing, unable to achieve qualitative breakthrough. Besides that, the concept of blended teaching and learning model has been implemented around the world. And the phenomenon appears in the educational informatization and modernization construction in different regions.

The Digital Divide was proposed by the U.S. National Telecommunication and Information Administration in its 1999 report that is call *Falling Behind Online: Defining the Digital Divide*. The digital divide refers to the gap that exists between who own tools of the information age and those who do not. It is mainly manifested in four aspects of ABCD and they are Access, Basic skills, Content and Desire.

Access refers to network access. Basic skills refer to information acceptance ability. Content means network content bias and Desire means personal interest of network users. Poor information in the cultural field caused by the imbalance of regional economic structure. Some universities have excessive or even wasted educational information resources, while some universities have difficulties in updating educational information resources and lack of maintenance funds. The uneven development and allocation of information resources will result in lack of social education information planning and construction, the insufficient development of media literacy in universities, and the serious polarization of social information. Moreover, the management mechanism of blended teaching and learning mode is not perfect.

Zhou (2022) proposes that the imperfect management mechanism of blended

teaching mode reflects in teaching evaluation mechanism and the evaluation mechanism of the sharing educational information resources among universities. Zhou (2022) further explains that in terms of teaching evaluation mechanism, the actual investigation of online teaching and learning is not satisfactory. For example, there are many phenomena that students do not study hard in order to complete tasks, they cannot make good use of resources. To construct an efficient, dynamic and intelligent online + offline blended teaching and learning management evaluation mechanism, improve the evaluation mechanism based on characteristics of disciplines. Besides that, vigorously invest in teaching practice is the top priority to enhance the blended learning evaluation mechanism. Only by adjusting the blended learning strategy and improving blended learning mode can realize learning efficiency.

For evaluation of educational resource sharing degree, there are many phenomena, such as excessive database construction. For view of those problems, all universities and schools should focus on improving the resource sharing mechanism, eliminate the three-level digital divide, but also avoid the waste of resources, reduce the planning and later maintenance of funds, constantly refine valuable educational information, extract important educational information, reduce meaningless educational information (Zhou, 2022).

Based on those above-mentioned difficulties, Zhou (2022) put forward the corresponding improvements. Zhou (2022) suggests that take innovation mechanism as the point to improve learning effectiveness in the first place. Then, to establish education management mechanism. With the amount of information oncoming,

strengthen the screening and integration of educational information can be conducive to better use of educational resources to improve their own thinking ability and practical ability. The online + offline teaching process includes three parts and they are pre-class preview, in-class teaching and after-class tutoring.

Within mimicry environment, hot research cases with theoretical knowledge for pre-class preview is important. In teaching progress, digital and multi-media teaching AIDS should be used to form a multi-dimensional teaching form. Information technology should be used for accurate, flexible and efficient after-class consolidation and tutoring, so as to better internalize knowledge into students' own things and improve the blended learning model. Blended learning evaluation mechanism should focus on the evaluation mechanism of learning effect.

In the first place, it is necessary to clarify the student-oriented idea, improve the students' efficient utilization of the vast and complex educational information resources. Therefore, it can enhance learners abilities on collecting and processing information.

Secondly, it is necessary to evaluate the effectiveness of teacher-taught courses, such as teaching content and teaching methods. Only through the innovation or improvement of each part can it be realized the high efficiency of blended teaching and learning.

Zhou (2022) also suggests taking data analysis as a line to increase discipline guidance. Big data can accurately grasp teaching problems. Then, teachers could immediately grasp and manage the obstacles in the teaching process through the fluid

data direction. Big data application could describe through the following three points.

From perspective of students, data analysis can help students find content suitable for themselves and meet their needs from extremely rich learning resources and effectively master it, so as to enhance students' exploration and thinking abilities.

From perspective of teachers, data analysis can help teachers dig out the details and clever thinking in the teaching process, analyze the advantages and disadvantages, so as to enhance teaching better.

From perspective of teaching and learning evaluation, through data tracking, students' practice level and teachers' teaching effect can be clarified, and comprehensive doubts existing in the current education and teaching process can be reformed in the environment. Only in this way can a reasonable and qualified blended teaching and learning evaluation mechanism be achieved.

Finally, Zhou (2022) suggested that information technology should be taken as a aspect to enable innovative teaching. Artificial intelligence can enhance the innovation ability of education. It enables blended learning better play the mutual interaction among teachers and students.

In specific teaching environment, blended interaction mode can be optimized and the precision teaching can be divided into blocks. For example, the new course learning can be carried out by Tencent Conference, Zoom, CCtalk and other Apps, and the question-and-answer session can be carried out by offline face-to-face way. Finally, the task can be completed by online homework in the course consolidation and review section.

In addition, students can also learn the knowledge they are interested in and need to expand in the shared educational information resource library, deepen their understanding of leaning content and form a closed loop. Finally, through artificial intelligence technology, students are encouraged to integrate what they have learned, improve their understanding of knowledge and summary ability, and enhance their enthusiasm and initiative. Zhou (2022) concluded that blended learning should be student-centered and focus on mental demands. Zhou (2022) illustrates that learning style is the core part.

For course planning and implementation process, discipline builder starts from the perspective of students and clarifies the demands of students. Currently, online learning software represented by massive open online courses, knowledge and learning has emerged in an endless stream, which not only improves the singleness of teaching mode, but also ensures the important position of learners. Effectively carry out blended mode of learning, give play to students' autonomy, and clarify the principles of course design.

Furthermore, blended learning takes pluralism as the core and should emphasize the integration of online + offline blended learning modes. Blended learning is deep integration of diverse educational learning elements. It mainly includes three aspects and they are the interaction of curriculum technology, the interaction of interdisciplinary and the divergence of multi-level thinking.

Through the blended learning mode, the teachers use the Internet, 5G, big data, cloud, VR, AR as well as new information technologies to enhance traditional learning,

promote the interaction among teachers and learners through multimedia. Therefore, it can realize the interactivity of curriculum. By sharing resources and databases, valuable course resources can be integrated enhance learners' learning efficiency and achieve cross-disciplinary interaction. The network platform is used to realize interconnection and cooperation, and in the process of cooperation, learners can learn from other learners' advantages and pool wisdom to realize the development of multi-layer thinking ability and enhance problems solving ability.

Besides blended learning theories, the practical researches also achieve fruitful results. Schmitz et.al. (2021) holds that the quality of surgical education was restricted suddenly by COVID-19 during the pandemic. The authors use the data from medical undergraduates by dividing them into a test and control group randomly. Before the written examination, the test group is implemented by using video platform and the control group is prepared by standard surgical text books teaching.

The authors find that the students using innovative blended learning techniques in digital format have better performance than the standard text books students. They propose concept on the development of an online-only courses education that uses blended learning as well as a fipped-classroom. They believe that their study might prepare the road for new concepts on new media and blended learning in future on surgical education.

Yang, et.al. (2021) conduct systematic review on the theories of blended learning to show the trends, gaps and directions of blended learning through following the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

This study indicates that the blended learning can influence students' psychology and behavior. Psychologically, blended learning can improve self-regulation of students on learning, satisfaction and engagement while learning in different areas. Behaviorally, blended learning can help students have good academic performance in different courses areas. However, the study also shows that blending learning is facing challenges on lacking of infrastructure and Information and Communication Technologies (ICT) skills for teachers, students and institutions.

Ginns & Ellis (2007) talk about the relationships between online and face-to face teaching and learning. They collect and analyze data by conduct questionnaires among undergraduate students at local university in Australia. The study aims to develop a method to evaluate the quality of online learning under the condition of online teaching and learning are used to complement face-to-face teaching and learning. Their study indicates that student-focused methods of teaching evaluation are possible in the context of blended online and face-to-face teaching and learning on the one hand. On the other hand, if teachers want their students to have good perform in blended contexts, and the value of moderation of student postings, and the value of interaction among students online should be clarified so that the students' perceptions and their grades could be improved.

Some studies shows that higher education benefits from blended learning because blended learning can meet different learning needs, help to construct collaborative communities and social-constructivist pedagogy (Bernold et. al., 2007; Fisher & Baird, 2005). Thai et. al. (2020) mentioned in their research paper that blended learning

combines the advantages of face-to-face learning and online learning. Moreover, blended learning can increase the learning opportunities through these various learning modes. This research paper also pointed out some other researchers have confirmed blended learning possessing positive impact on student satisfaction and academic achievement (Deperlioglu & Kose, 2013; Glogowska et. al., 2011). This study collected data from third-year undergraduate students in a South Vietnam university and implanted qualitative study. The research findings shows that blended learning has significant positive effect on learning performance. By analyzing the focus group data, blended learning and online learning reveals more flexibility in time and place for providing students learning.

In order to deeply understand the emotional experience of university students under the situations of online, face-to-face and blended learning, Zou et. al. (2022) collected 235 effective data among 425 university students of a Hangzhou University of China. Their research paper tried to answer three questions. What emotional experiences do learners get in the three different learning situations: online, face-to-face and blended learning? What are the characteristics and differences among those three different learning situations? Which learning situation do students prefer to choose? This study applied both qualitative and quantitative research methods to analyze the emotional experiences characteristics of learners.

The study found that blended learning tended to bring positive emotional experiences to learners. Under blended learning situation, the learners mentioned the class is worth looking forward to the most frequently, followed pleasure and

satisfaction being mentioned, and the emotional description of challenges were the least mentioned. The learners generally accept blended learning and gain more in learning process. 61.3% learners prefer to choose blended learning. The main reason is that they want to merge the advantages of both online learning and face-to-face learning. The learners said that online learning is more convenient to obtain a large number of learning materials, while online learning will not have the sense of reality of class and only face-to-face learning is too monotonous and unattractive. Blended learning can enrich the learning forms of class with a sense of reality and freshness.

4. THEORETICAL FRAMEWORK

This dissertation applied Community of Inquire Framework for studying Lingnan University students' attitudes on online and face-to-face learning during COVID-19. There are three reasons for me to choose this theoretical framework.

First, Community of Inquire Framework can be applied to take students as community members rather than a single individual that can help to study on the interaction and cooperation among students and the relationship between students and teachers.

Second, Community of Inquire Framework emphasizes the interaction among cognitive presence, social presence and teaching presence that contributes to study on comprehensive and various aspects of online and face-to-face learning, including students' learning process, interaction among students and teachers' guidance and support, etc.

Third, Community of Inquire Framework provides a systematic research method to look into students' attitudes and perceptions on online and face-to-face learning through analysis of cognitive presence, social presence and teaching presence.

To sum up, Community of Inquiry Framework is a kind of effective method for studying students' attitudes on online and face-to-face learning that is helpful to provide reference for improvement and optimization on online and face-to-face learning.

4.1 Community of Inquiry Theory

Community of Inquiry (COI) theory was proposed by Canadian scholars Randy Garrison, Terry Anderson and Walter Archer in 2000. Community of Inquiry theory assumes that the basis for online learning study is inherently collaborative and constructivist.

Randy Garrison and his partners carried out a study in 2000 for providing conceptual order and a tool to support education experiences by using computer mediated communication (CMC) and computer conferencing (Garrison et. al, 2000). The core of that study is to propose a model of community inquiry which is called Community of Inquiry Framework.

Cognitive presence, social presence, and teaching presence consists of Community of Inquiry Framework (Garrison et. al, 2000). Through computer-conferencing transcripts analyzing, the analysis yields indicators (keywords/phrases) for each of the three elements. The indicators (keywords/phrases) of each three elements provide a template and a tool for researchers analyzing written transcripts that can guide the educator to best use computer conferencing as a medium for better education (Garrison et. al, 2000). Garrison et. al, 2000 also indicates that their study also shows the great potential of the computer conferencing in establishing community of inquiry for education purpose.

According to Garrison and his partners, computer as communication medium becomes more and more common which is used in higher education. What's more, more and more higher education institutions are doing their best to make the computer

as a multi-functional communication medium providing education plans at any time and any places, especially in using of computer conferencing. Though the people who are leading the development of new media believe the great potential of computer as a communication medium, computer as a communication impacting on the learning process and learning effect has not been studied well.

Therefore, they proposed conceptual framework so as to confirm the key prerequisite elements of successful higher education experience. They also illustrate each of those key prerequisite elements and their relationship. They hold that it is important thing that how to maintain those key prerequisite elements of higher education experience when higher education enters in the environment of computer as a communication medium.

As it is showed in FIGURE 1, the valuable education experience is embedded into the community of inquiry. Teachers and students are key roles. The model of this theory claims that learning happens through interaction among three key prerequisite elements in community. FIGURE 1 presents three basic and key prerequisite elements. They are cognitive presence, social presence, and teaching presence.

Garrison and his partners carry out the research of application computer conferencing in education, they discover the words or phrase and segments displaying the three basic and key prerequisite elements that are cognitive presence, social presence, and teaching presence. Those indicators appear through some key words, phrases and synonyms. Because of being easy to apply, be accurate and be in order, Garrison, Terry Anderson and Walter Archer organize those indicators into groups so

as to present the stage and aspect of each indicator (Garrison et. al, 2000).

FIGURE 1 presents the relationship among the three basic and key prerequisite elements and the indicators that appears tin computer conferencing and the place of community of inquiry as well as the categories of the indicator groups. The application of the categories names because they could be self-evident. But Garrison and his partners still illustrate each category in detail (Garrison et. al, 2000).

Cognitive presence is the most basic to element being successful in higher education. It refers to the participants constructing meaning through continuous communication in any special structure of the community of inquiry. Though in traditional face-to-face condition, that principle works with no problems. But, for example, under the condition of the communication medium changes, the computer as a communication medium is applied for education purpose that should be pay attention to particularly (Garrison et. al, 2000).

As for the second core element is social presence. This term is defined as the ability of the community of inquiry participants project their personal characteristics into community so that they present themselves to other community of inquiry participants as real people. The primary importance of this element is to support cognitive presence so as to facilitate the process of learners critical thinking indirectly. However, when education process exists emotional aim and pure cognitive goal, that is, participants feel happy and a sense of personal success is very important so that they could stay in the learner team during courses, Therefore, social presence is the direct contributor of education experience success (Garrison et. al, 2000).

Teaching presence is the third element of this model. It includes two general functions. And teaching presence could allow any one of participants to perform in community of inquiry. Under the education environment, those functions may be the main responsibilities of teachers. The first function is education experience design. The teachers or instructors usually implement the first function. The second function is facilitation which is the common responsibilities of teachers, all participants or part of participants and learners. Under any conditions, teaching presence is the means of achieving goals which supports and strengthens cognitive presence and social presence so as to realize education achievements (Garrison et. al, 2000).

Traditionally, education interaction happens between oral communication between teachers and students. Oral communication is often fast-pasted, spontaneous, transitory and it is less than logical than text-based communication. Though oral criticism may be supposed to be non-ideal features of being strict in discipline and disciplined mindset. In addition, face-to-face communication provide many kinds of nonverbal or paralanguage clue (Garrison et. al, 2000).

By contrast, written communication is a kind of simplified medium. In written communication, the information set up and sustain the dynamic groups. Written form as basis of medium, for example, the computer conferencing is applied for education purpose, there may appear a question that will lead to learning quality decline if the communication channel slops down through filtrating a good deal of nonverbal or paralanguage communication. Comparing with traditional classes, one of advantages is that text-based provides time for reflection. Therefore, when the learning goal at the

high stage cognitive, text-based communication may be more recommendable than oral communication in fact.

As a matter of fact, some literature show that written communication has close relationship with careful and critical thinking. These authors hold the view that just the reflection of written words and clear nature encourage us to abide by disciplines and preciseness in the process of thinking and communication. In fact, when the target is to promote deep thinking for complex problems, written application may be the vital learning mode. When written is used as supplementary communication mean, it supports this hypothesis even as the condition of face-to-face, such as the outline on the white board, management fees and written handout, etc.

Garrison et. al (2000) hold a view that it is a possibility that text-based communication with little written words may have some relationship with the realization of higher level of learning goal. In fact, if the text-based communication and oral communication is researched carefully, it could be found that the relationship between text-based communication with little written words and the realization of higher level of learning goal is not that so simple and clear as above mentioned.

Though it can be seen from all kinds of indicators, oral communication usually is clearer and more complicated, it is only a kind of development trend. No matter oral communication or written communication can be applied in all kinds of styles. In spite of above mentioned is a general trend. But in fact, some kind of oral communication styles are clearer and complicated than written communication (Garrison et. al, 2000). Chafe and Danielewicz (1987) found that for written communication and oral

communication, the two different communication ways may have different impact on mode of thinking of people.

Therefore, one of the goals of Garrison and his partners carrying out community of inquiry theory research in 2000 is to study the written language characteristics that is used in computer conferencing. At the same time, those characteristics promote the realization of critical thinking.

4.2 Community of Inquiry Framework

There is still have much to learn on how to take charge of computer conference through benefiting to develop significant and valuable education experience (Garrison et. al, 2000). It is universally believed that social environment impacts the nature and outcome of learning activities to a large extent. To be more specific, community plays an important role in high-order thinking (Lipman, 1991). Lipman (1991) holds the view that if critical thinking can be promoted and in-depth learning can be realized, community of inquiry is valuable background which is dispensable to education experience. Significance of negotiation, diagnostic misunderstanding and the opportunity to challenge accepted beliefs are of the essence for profound and significant education experience which is the same as Lipman (1991) describing community of inquiry.

Currently, some literature keeps a watchful eye on a precondition. The precondition is that learners' personal world must be considered in valuable learning experience. It means reflection and focusing on significance. The precondition also

needs to take sharing world of purposeful and structured education environment into account. The sharing world refers to cooperation and focus on knowledge. Some scholars call that as collaborative constructivism perspective of teaching and learning transaction. This opinion holds that the best performance form of education experience is a kind of collaborative communication process and its aim is to construct meaningful and valuable knowledge.

Cooperation is regarded as one of important aspects of cognitive development, because cognitive development cannot be discussed in isolation from social environment (Garrison et. al, 2000). According to Dewey (1959), he found that the process of education has two aspects. One aspect is psychological and another aspect is sociological. Any aspect cannot be superior to the other or ignore that the other can bring bad result. He also considers that education is a kind of cooperative reestablishment of education.

For the point of education is a kind of cooperative reestablishment of education, Garrison et. al (2000) have confirmed cognitive and social elements of community of inquiry for education purpose. That is the responsibility of designing and integrating cognitive and social elements for education purpose. Non-synchronous, as opposed to synchronization, means that the sender and receiver of a message do not need to share a common clock. In the communication scenario, it means that the two sides people do not exchange information at the same time. A typical example is E-mail or message.

Compared to synchronous communication with common WeChat, phone, and online meetings or computer conference and non-synchronous communication can

reduce mental demands, give both two sides people more room or space to think, and make it easier to record communication information. Non-synchronous collaboration based on non-synchronous communication, on the other hand, intentionally reserves time for thinking and processing during collaboration, does not disturb others focused work status, so as to harvest higher quality output, and it is very suitable for cross-time zone cooperation and remote working or learning.

Computer conferencing of computer conference can be regarded as a kind of non-synchronous communication and computer conferencing can enhance collaboration through asynchronous participation. If someone can't make it to a meeting because of a scheduling conflict, vacation or absence, sharing detailed recorded computer conferencing can quickly get them up to speed. Whether the text-based non-synchronous environment can support high quality education transaction and education experiences enough? The nature of communication of computer conference may be cooperative, but face-to-face conference is quite different from it. Because of computer conference as an education tool having little experience, its influence on learning quality cannot be sure (Garrison et. al, 2000).

Both Anderson & Garrison (1995) and Clark (1994) grant that there is an opinion is correct that teaching designing and how to create learning environment by applying technology is crucial to realize high quality learning results. In other words, if most of technologies are applied artful, they are powerful enough to meet the needs of education extensively and realize all different kinds of ideal results. However, cooperation is not only determined by users' skills but also depend on what kind of

tools are used. In addition, it is inevitable that technology shape the communication manners among people.

According to the theory, computer conference has quite powerful potential in establishing critical community of inquiry with supporting critical thinking. Especially in distance education area, computer conference represents an era which is post-industrial age of distance education (Garrison, 1997). Because it can non-synchronously establish learners' cooperative community of inquiry through cost effectiveness method (Garrison et. al, 2000).

Most of online and face-to-face teaching and learning studies apply Community of Inquiry (COI) framework in the researches. This research also applies Community of Inquiry (COI) framework in this dissertation. The framework includes theory, method and instruments. The theoretical framework based on the view that inquiry is a social activity and the essence of the teaching experience, guided by social constructivism theory, and emphasizing the importance of online learning interaction.

The theory postulates that a valuable online learning experience takes place through interactions between members of a survey community of teachers and students. In order to make meaningful learning to take place in this community, three forms of presence need to interact and influence each other (Traver et. al., 2014). Theoretically, the three forms of presence of this model consists of social presence, cognitive presence and teaching presence (Garrison et. al., 2010). The three forms of existence work together to create a meaningful, collaborative, and constructivist discourse that is necessary for higher level learning (Garrison & Arbaugh, 2007; Garrison & Akyol,

2013). The Community of Inquiry (COI) Model is as following,

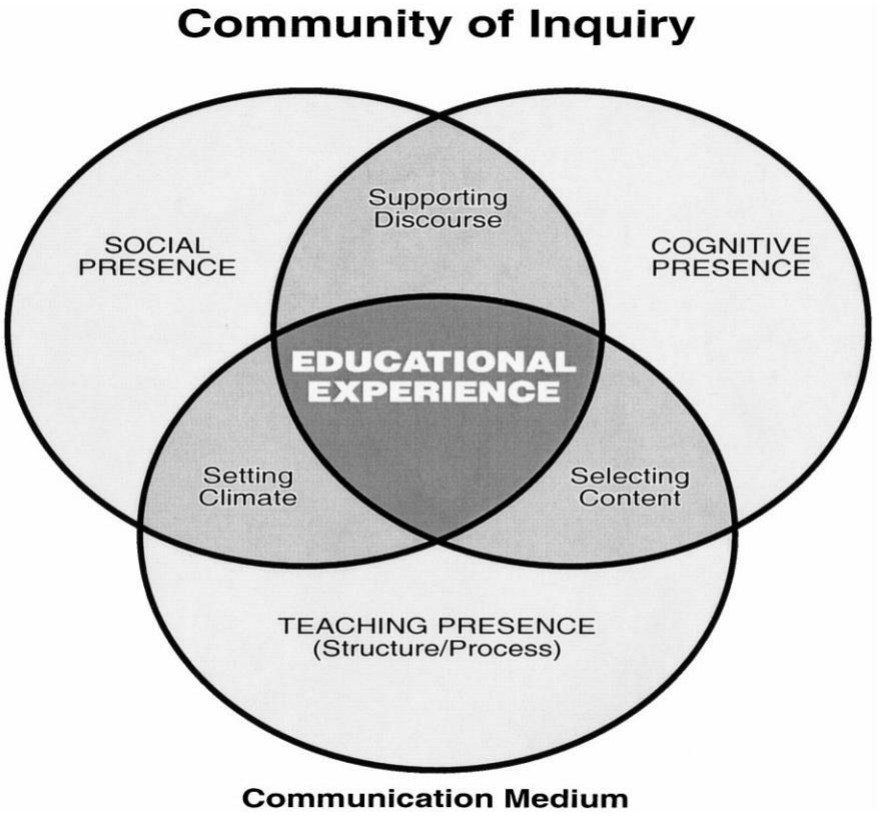

FIGURE 2 An interactive online learning framework. Elements of an Educational Experience (Garrison et. al., 1999)

1. Cognitive Presence

Cognitive presence refers to the degree to which learners construct and consolidate meaning through constant reflection and dialogue in a critical inquiry community (Garrison et. al., 2001). The occurrence of cognitive sense of presence mainly stimulates students to enter the learning state by determining a problem and setting a task. Students develop solutions to the problem and finally solve the problem by exploring the problem or task and analyzing and integrating the information in the exploration process (Huang et. al., 2018). Therefore, cognitive presence realizes

meaningful learning mainly through the four stages of the Practical Inquiry Model (PI), namely triggering events, inquiry, integration and problem solving (Huang et. al., 2018).

Cognitive presence refers to degree of meaning construction that participants participate any specific collocation of community investigation by continuous communication (Garrison et. al., 1999). Though there still exists some problem in traditional face-to-face education, when communication medium is changed, this should be pay attention to in particular if computer mediated communication (CMC) is applied for education purpose. Cognitive presence is an important element on critical thinking. It is usually regards as surface goal of high education.

In the group of community of inquiry, the degree of cognitive presence is produced and maintained is determined in part by how the media restricts or encourages communication. There is little empirical research to promote deep and meaningful learning in higher education through the application of non-synchronous and text-based collaborative communication (Garrison et. al., 2010).

Newman et.al. (1997) find that there are significant differences on the aspect of critical thinking between computer conference and face-to-face seminar. To be more specific, the learners who participate in computer conference more tend to introduce external materials and they connect their ideas with solutions. The students who participate in face-to-face conference has a little bit better in the aspect of producing new ideas. The finding is in line with that the students who participate in computer conferencing have weak ability of interaction among people. Though these students

speak less, they have higher level of critical thinking.

Newman et.al. (1996) draw a conclusion that the students who participate computer conference adopts more serious and more valuable style when they are in the computer conference and they just like writing an article with high-proportioned important statement. This finding seems to support Garrison's theory that the computer conference environment promotes in-depth and meaningful learning potential.

Gunawardena, Lowe, and Anderson (1997) carry out heuristic research on knowledge construction in computer conference environment. They organize a group of distance education professionals to debate according based on list-serve form. However, from the perspective of education, the finding may be limited because there is teacher to guide and supervise the whole process through lead to discuss, diagnose misunderstandings and negotiate significance.

But through analyzing the transcripts on the basis of ground theory, Gunawardena, Lowe, and Anderson (1997) propose CMC interaction model which is similar to the process of critical thinking and Garrison (1991) model in particular. An interesting finding is generated through applying the model of transcripts analysis and it indicates that the level of knowledge construction is lower than researchers' expectation and is also lower than perception of participants (Kanuka and Anderson, 1998). This finding is generated under the assumption of being lack of existence of teachers in computer conference this time (Garrison et. al., 1999).

Research is carried out which is about computer conference supporting to promote critical thinking under formal education background (Bullen, 1997). He organizes and

complete evaluation extensively among 18 full-time university students. Bullen (1997) applies questionnaires, quantitative measure, interviews and observation and conferencing transcripts analysis to find the factors that influence students' participation and critical thinking. The analysis of transcripts content includes the analysis of four categories active and negative recognition on critical thinking skills (Norris and Ennis, 1989).

Norris and Ennis (1989) define those four categories. Garrison (2000) considers that this research has serious problem on its methodology and transcripts analysis and he thinks the coders is unreliable as other research reports. In addition, that article does not discuss each analysis unit seriously in that research.

Garrison et. al (2000) holds the view that all those researches have to face the challenges of the methodology problems on creating and applying effective indicators, and those indicators reflects the quality and degree of promoting in-depth and meaningful learning methods in computer conference environment. The challenges lie in the selected indicators should be specific enough, meaningful and enough to be extensive as well as can be applied in transcripts analysis.

Therefore, cognitive presence is essential to the process of education transaction and individual should feel comfortable among interactions. Cognitive presence is not enough to sustain a group of learners with critical thinking. This kind of education community is cultivated in the environment of communication, transaction and more extensive social affections.Participation is the necessity of developing high levels thinking skills and cooperative work.

2. Social Presence

The effect of social presence is to support cognitive presence and it is a process of indirectly promoting the learners' group to critical thinking. However, when the education process both have emotional aims and have pure cognitive objectives, that is to say, the important things is that participants find group interaction delightful and self-fulfillment so that participants will stay in learners' group for continuous course learning, then social presence is direct factor of education experience success (Garrison et. al., 1999).

Social presence refers to the ability of learners to express themselves socially and emotionally in a friendly and supportive learning environment (Garrison et. al., 1999). It provides learners with an environment to foster meaning negotiation, collaborative knowledge construction, and critical mindset (Wu & Chen, 2017) and to promote critical thinking and higher-level cognition in the community. Online learning environment lacks face-to-face emotional communication and learners often feel lonely, which directly affects the persistence of online learning (Huang et. al., 2018). Therefore, the use of emotional expression, self-disclosure and other ways to establish and maintain a sense of social presence is particularly important to improve the effect of online learning, which mainly includes emotional expression, open communication and group cohesion (Huang et. al., 2018). Considering computer conference is highly depending on written words. Social presence is social and emotional project ability of a participants of community of inquiry being a real person through the communication medium what his or her uses.

Garrison (1997) and Gunawardena (1995) argue that when the importance of social presence is established and the cognitive presence can be easy to be sustained. In other words, social emotion interaction and support is important and sometimes it is necessity for realizing meaningful and valuable education outcome. Social presence could be possible to happen in computer mediated communication (CMC) with the form of social and emotion communication but it is not automatic. It suggests that computer mediated communication (CMC) users apply their language and text behaviors in adapting to social disclosure, request and presentation of relationship behavior.

As a consequence, when medium reduces and eliminate visual clue, the participants of computer mediated communication (CMC) seems to be able to develop compensation strategy. All the communication can lead to misunderstanding which also includes mediated communication. Therefore, it can benefit from compensating redundancy (Garrison et. al., 1999).

It is found that social presence plays a key role in establishing a group of critical learners (Fabro & Garrison, 1998). In fact, it does not reveal the process of producing valuable results. That is a process of cooperation. Critical reflection and statement can be encouraged and practiced during that process (Garrison et. al., 1999).

Cooperation is a kind of sharing creation behavior or sharing discovery behavior (Schrage, 1995). Cooperation is a kind of teaching and learning approach. The difference between cooperation and information exchanging lies in in-depth participating conversation and giving lecture to a group of people. They use different

words, different tone, different manner of speaking, different attitude and different tools (Schrage, 1995).

If students would like to understand current education process and abundant incomprehensible information of society as well as go beyond information delivery, it is crucial to establish cooperative community of inquiry. The education process has close relationship with initiation. It not only need to enter common knowledge system. That is crucial to cooperation and criticized words. Cooperation inquiry offers a qualitative dimensionality that go beyond acquiring content of disciplines (Garrison et. al., 1999).

When computer conference participants have never seen each other, lacking of visual hint may bring special challenge on establishing social presence. And it is important to describe the participants how to develop technologies, for example, how to use emotion icon or to display other non-normal symbols (Kuehn, 1993). If computer conference can help establish social presence through this kind of method so as to support cooperative community of inquiry, it may promote proper technology of high education even if it is limited to written language (Garrison et. al., 1999).

The consciousness of critical thinking and inquiry dynamic is a kind of basic meta-cognitive ability (Garrison et. al., 1999). It encourages students to deal with problems strategically, actively look for source of knowledge, discover prejudice, screen information among more and more existing information as well as formulate and defend one's own knowledge standpoint.

Garrison et. al. (2000) holds the opinion that it is crucial to complete this process

in interaction and social environment. It is only the best environment if education transaction happens in face-to-face environment. As a matter of fact, education transaction does not always happen in face-to-face environment. Apparently, it is necessary to understand how to utilize the medium communication technology of computer conference to support education (Garrison et. al., 1999). In the real community of inquiry, the keynote of information is query but it is fascinating, expressing but responding, suspecting but respecting, and challenging but supporting.

3. Teaching Presence

Teaching presence is usually composed of general functions that can be carried out by any participants. Teaching presence refers to the design, promotion and guidance of cognitive and social processes in the realization of learning outcomes with personal significance and educational value (Anderson et. al., 2001). To put it simply, teaching presence means that participants who usually refer to teachers are responsible for creating an effective and clear objective inquisitive community to do what the participants should do (Garrison & Akyol, 2013). It includes setting curriculum content, designing learning activities, arranging time series of learning activities, and organizing, supervising and managing collaborative reflective activities with purpose. It also needs to ensure meaningful learning by designing and arranging a series of teaching activities, as well as supervising and guiding students' learning process. Teaching presence can help learners construct and share knowledge and strengthen their sense of social and cognitive presence (Garrison et. al., 1999). At the same time, teaching presence plays an important role in learners' satisfaction and online learning

effectiveness, which mainly includes three subcategories: design and organization, facilitating dialogue and direct guidance (Huang et. al., 2018).

If computer conference is the main communication approach of education experience and the above-mentioned statement is particularly correct (Garrison et. al., 1999). Gunawardena (1991) and Hiltz & Turoff (1993) hod the view that as a matter of fact when computer-based education faces with failure, usually because there is no guidance.

In regard to students' activities of computer conference, research finding shows that students activities of computer conference are influenced by tutor behavior (Tagg & Dickenson, 1995). To be more specific, Tagg & Dickenson (1995) generate a conclusion that the tutor or instructor being on the scene producing characteristics that the tutor or instructor acknowledges the contribution of the students by messages and give the students guidance whereafter so as to increase students' activity. According to Fabro and Garrison (1998), in the same way, in the exploratory research of computer conference, interview and student focus group, if people would like to facilitate higher lever learning achievements, it is essential to establish a host that he or she can simulate and contribute critical utterance and constructive comment. Computer conference management provides many kinds of management approaches. Among of those approaches used in discussion, group scale confirming, understanding and utilization of communication medium as well as face-to-face conference supplementary using (Garrison et. al., 1999).

Because of media possessing non-synchronism, learners have time to think and

reflect, and after they form their own thoughts, they discuss them. Fabro & Garrison (1998) claim that if reflection is allowed to be encouraged and utilize the power of media, then the students need analyze and the amount content must be restricted. As a consequence, discussion topic or subject should be arranged to last one or two weeks at most to avoid same topic appearing with abundant posting. The same as face-to-face conference, computer conference can set up small size separated discussion groups with a few participants so that it can provide continuous conversation opportunity for single topic or subject that do not generate much posting in large group (Garrison et. al., 1999).

The other teaching problem is to take advantage of cooperation function of computer conference. People plan to design computer conference to support education experience, it should be considered to build relationships and comfort level of initial face-to-face conference. Maybe it is unrealistic, but if it is possible and can be realized, it should be used so as to establish teaching presence and delivering and negotiating expectations (Garrison et. al., 1999). In order to acquire meaningful and valuable learning achievement, there are still many things need to be done for requiring the basic knowledge on designing and organizing computer conference.

4.3 Community of Inquiry Coding Template

Among the three elements, cognitive presence is the process and outcome of critical mindset (Garrison et. al., 2001). Social presence is represented by the participant's ability to integrate into the learning environment, enabling the participant

to demonstrate their true self and indirectly promotes the critical thinking process of learners (Garrison & Arbaugh, 2007). Teaching presence is the main function of teachers, which should not only realize teaching objectives, but also support and enhance social and cognitive existence (Anderson et. al., 2001).

The emergence of the theoretical framework of inquiry community provides a unique perspective, method and tool for online and mixed learning research. Based on this theoretical framework, researchers have conducted extensive research and verification on how to use online and hybrid learning support to promote learners' critical thinking generation and achievement of higher-order learning goals. The framework is considered to be one of the most successful and influential theoretical frameworks in the field of online learning in the last two decades (WAN et. al., 2020).

In order to make the Inquiry Community theory better guide mixed learning practice, Garrison and other scholars proposed a Community of Inquiry Coding Template corresponding to the three core elements. This Template framework contains three elements and ten categories. Indicators for each category are given as examples to facilitate understanding.

When Garrison et. al. (2000) investigates computer conference for education purpose. For the reasons of being relevant to application, precision and sequence, those indicators are divided into groups so as to more clearly present the stage and aspect in of each indicator of each group.

The challenge that researchers face is identify and evaluate meaningful activity signs in the environment of computer conference for education purpose. In order to

cope with this challenge, the researchers need reliable tool which is coding tool analyze written transcripts. In order to increase available stock of reliable tool, the researchers investigate development of analytical template that community model applies in computer conferencing transcripts (Garrison et. al., 1999). This template is classified into indicators that indicate whether it exists effective key elements of community of inquiry. These indicators are classified into several categories and that shows as following TABLE 1.

Elements	*Categories*	*Indicators (examples only)*
Cognitive Presence	Triggering Event	Sense of puzzlement
	Exploration	Information exchange
	Integration	Connecting ideas
	Resolution	Apply new ideas
Social Presence	Emotional Expression	Emotions
	Open Communication	Risk-free expression
	Group Cohesion	Encouraging collaboration
Teaching Presence	Instructional Management	Defining and initiating discussion topics
	Building Understanding	Sharing personal meaning
	Direct Instruction	Focusing discussion

TABLE 1. Community of Inquiry Coding Template (Garrison et. al., 1999)

4.4 Conclusion

Connected with the COVID-19 practical situation, social presence means the ability of studying or communication in a trusting environment and forming personal relationships progressively. Schools and universities policies and travel restrictions lead to schools and universities to choose online teaching and learning because of COVID-19 pandemic.

Cognitive presence refers to the learners could construct and make sure the meaning of the knowledge through reflection and interaction. The students have to choose online learning because of long time quarantine and travel restriction. On the one hand, they have to communicate with teachers and classmates online with no direct social communication on site. On the other hand, online learning and communication can relieve some pressure and anxiety caused by COVID-19 pandemic. Teaching presence illustrates that using design and facilitation to realize the valuable and meaningful learning outcome on the basis of social presence and cognitive presence. The teachers utilize some teaching materials and methods to arouse students interests on online learning during COVID-19.

5. RESEARCH METHOD: FOCUS GROUP AND ONE-ON-ONE IN-DEPTH INTERVIEWS

This research applies focus group and one-on-one in-depth interviews as research methods in this dissertation.

5.1 Focus Group

Focus group also known as group in-depth interviews, are one of the most widely used research methods. focus group interviews played an important role in applied social research programs during World War II. focus group interview is mainly used in marketing and sales to determine the public's opinion on a product, so as to achieve the purpose of increasing sales. The general goal of focus group in education and psychology is to determine the actual opinions of the participants in the most meaningful way, rather than to persuade the respondents (Wang, 2016).

Merton is the father of focus group. He said that focus group serve two roles: one is to further examine a specific experience, such as a reaction to a movie or radio show. The second is to get a response to the recurrent behavior (Vaughn et. al., 1996). As a qualitative research method, focus group is a group interview, in which there are several participants besides the host.

In addition, focus group provides qualitative data and focus discussion. The main difference between focus group and other types of research, such as individual interviews, is that focus group setup facilitates the collection of research data. Focus

group is more than just a group of people getting together to talk and it is a special type of group in terms of size, purpose, composition and process. The purpose of focus groups is to listen and gather information. Participants are selected because they have certain characteristics in common, and these characteristics are related to the topic of the focus group. (Wang, 2016).

Instead of forcing participants to vote or reach consensus, researchers created focus groups in a relaxed environment where participants are encouraged to share their views and opinions (He & Ran, 1998). Focus group invite groups of similar participants to discuss each other separately so that researchers can identify broad trends and patterns (Wang, 2016).

The differences between focus group and other group interviews are lies in that focus group is better organized and more formal in form, and the results are generated from interview transcription analysis. In addition, focus group are often used to reach consensus or solve problems, while focus group aim to find out everyone's point of view and encourage people to express different points of view. Focus group are designed to get people's opinions and not to confirm their opinions (Wang, 2016).

Since Merton who is the father of focus group, focus group has become an important research tool for applied social scientists in the fields of project evaluation, marketing, health and communications (Wang, 2016).

There are four important parts in focus group. The first part is the preparation phase. In the first phase, the researcher should develop a plan that includes project objectives, detailed sample selection, number of focus groups, and responsibilities of

the researcher (Hu, 2010). Once the purpose is clear, the researcher can conduct a literature review and consult experts related to the research topic.

The second important part is the participants. Participants were not chosen at random, but for the purpose of the study. The researcher should consider the demographic characteristics of the target population and the characteristics that are relevant to the target topic discussion.

The third important part is the host. The host should be skilled in interpersonal communication and impartial. It is the host's responsibility to gather ideas from the participants' discussion. The role of the host is to create a supportive, non-critical atmosphere that encourages the participation of others.

In the beginning of Focus group, the host should organize friendly introductions first, then begins to discuss general questions, and then moves on to specific questions. The host can utilize exploratory methods to facilitate interaction, narrow discussion or expand to new issues. At the same time, the host should encourage participants, such as eye contact and nodding now and then. At the end of the discussion, the host should summarize the results of the discussion and asked participants to provide opinions that they think are important but were not discussed. This approach can yield some valuable data that doesn't come up in the discussion.

The fourth important part is data analysis. Analysis of data generated from focus group is qualitative. Researchers interact with groups that share ideas and perspectives and determine the theme of focus group. Finally, the researchers reviewed the transcribed the record and notes to capture key ideas again (Wang, 2016).

Wang (2016) pointed out that as one of the hottest research methods in the social sciences, focus group have many advantages. Firstly, it provides easing effect. In a relaxed group, participants feel that their views and experiences are valued and are more likely to express their views and opinions. One of the main reasons that researchers in educational psychology choose to use focus group interviews lies in the relative simplicity of focus group.

Secondly, focus group can generate large amounts of data and accurately perceive topics. Focus groups not only capture a wide range of topics that might otherwise not be observed, but also ensure that the data is closely related to the research topic, which is fast and easy. In addition, focus group interviews have a quick turnaround time for data collection.

Therefore, in a relatively short period of time, researchers can gather specific information. Focus group can be used when reliability and validity of information collection are lacking. Focus group also have some other advantages. They allow researchers to understand why people feel the way they do, and they give researchers the opportunity to study the structure of collective consciousness on a phenomenon and its surrounding meaning (Wang, 2016).

There are three reasons to apply focus group as a research method in this study. Firstly, focus group can obtain data quickly, less costly and easy to set up. Secondly, focus group can observe non-verbal behavior such as body language. Thirdly, focus group can gain insight to a topic that may be more difficult to gather information through other data method.

Focus group questions are designed based on Community of Inquiry Framework that mentioned in theoretical framework part. The open-ended focus group Questions are used in focus group, as following,

1. Please introduce yourself and your educational experience in Lingnan. How many courses you have taken and describe your online learning experience.

2. How do you feel the social anxiety when you study online during the COVID-19?

3. If online learn cause your psychological anxiety, what would you do?

4. What do you think online learning challenges that you face?

5. How do you solve problems when you are facing challenges or difficulties at online learning class?

6. How does online learning influence your approach to problem solving?

7. Please share your views on online learning course content, learning activities and schedule.

8. Please share your views on online learning course self-expression, communication and collaborative.

9. Please share your views on the effectiveness of online learning.

10. Which learning mode do you prefer, online or face-to-face learning? Why?

11. How do you utilize the online learning courses materials? Please share your views on the online learning courses materials.

12. Please share your views on the role of online learning in teaching? If you could improve online learning and teaching in your class, what it would be?

5.2 One-on-one In-depth Interviews

One-on-one in-depth interviews is research method and a kind of qualitative method. It usually only includes two people who are interviewer and interviewee. And an in-depth and detailed conversation, discussion and interaction with open-end questions happens between those two people. It is often applied in academic researches for data collection and exploring more information. One-on-one in-depth interviews has its obvious advantages. It establishes a kind of more personal relationship between interviewer and interviewee that is helpful to get trust from interviewee and encourage interviewee to share more her or his opinions, ideas and information. It allows to occur in-depth conversation that is good for producing and collecting richer data. This method provides time and space to interviewee for asking questions from interviewer that help interviewee better understand the research and is helpful to collect accurate and detailed data. It also offers opportunities to interviewer for clarifying unclear problems and exploring the problems that may not have been solved initially.

This dissertation applies one-on-one in-depth interviews with 5 students of Lingnan University who experienced boteh online learning and face-to-face learning at Lingnan University during Covid-19 pandemic by using some questions with focus group.

5.3 Research Design

This research uses thematic analysis based on Community of Inquiry Coding Template to process the data. The steps of thematic analysis include six steps. They

are Transcribe, take note of items interest, code across the entire data set, search for themes, review themes by mapping provisional themes and their relationships, define and name themes and finalize analysis.

During that process, the data are coded, categories and defined the themes according to the three dimensions of Community of Inquiry that mentioned in theoretical framework which can be seen in the Community of Inquiry Coding Template that opposed by Garrison, Anderson and Archer in 2000.

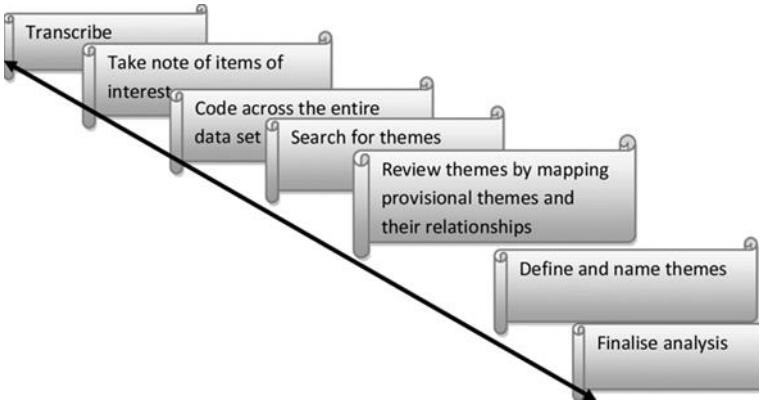

FIGURE 3. Steps in thematic analysis (Adapted from Braun and Clarke, 2013; 2006)

The research is designed starting by sending participants invitations to Lingnan University students with 5 students' one-on-one in-depth interviews and 10 students focus groups discussion. The 10 students of focus group are formed into 2 groups with 5 students in each group. The 2 groups students are numbered by Group A and Group B. Focus groups last 1 hour and 34 minutes average time for each group with tailor-made questions prepared in advance for collecting data. The average time for each student's one-on-one in-depth interview of those 5 students is about 1hour and 4

minutes. The one-on-one in depth interview questions are the same with the focus groups discussion. The specific interview questions list has mentioned in previous focus group section. The total interview time of both focus groups discussion and one-on-one in-depth interview is 508 minutes and it is almost 8.5 hours interview time in all. All the interview participants are Lingnan University students during COVID-19 pandemic. They are from different majors that include Translation, Chinese, Animation and Digital Arts, Policies Study, Human Resource Management and Organizational Behavior, Business Psychology, Philosophy, Business and Administration in Marketing. Those interview participants cover undergraduate students and graduate students.

5.4 Data Collection

The data is collected through Zoom with opening camera for the two-focus group with 10 students in all and by face-to-face interview for the one-on-one in-depth interview of 5 students. The total interview time of both focus groups discussion and one-on-one in-depth interview last almost 8.5 hours in all. The data is collected according to community of inquiry template.

5.4.1 Cognitive Presence

Most of participants express that online learning facilitate to take full advantage of the internet to help them learn and they become more independent to solve problems when they face challenges or difficulties. Some of them explain that online learning is

efficient and gives students more choices. For example, some courses can choose to listen to lectures at double speed or selective to listen the key points of the courses, etc. But some participants do not like online learning, because they do not think online learning is efficiency, especially for those students who are not so that self-disciplined. For example, some participants respond as following:

1. How do you solve problems when you are facing challenges or difficulties at online learning class?

Group A1 “Solve by myself and do some self-adjusting，ask for help from others.”

Group A2 “Convince myself to tackle the problem as early as possible, so it won’t bother me for a long time. As the workload won’t change, Why not finish the task ahead of schedule.”

Group A3 “Because there are fewer opportunities to communicate with professors face to face, I have to look up materials online or write down the questions and ask them together in the teacher's Office hour.”

Group A4 “Video conference, more communication with chat software.”

Group A5 “I always through meeting via video, phone or zoom.”

Group B1 “Study by myself.”

Group B2 “I feel that there is no other way but to be patient, learn to compromise with teammates and negotiate to achieve goals.”

Group B3 “The only way to send emails or leave WECHAT message to the teachers or team-mates, but only received the reply from teachers.”

Group B4 “I would try my best to read more learning materials to understand

some difficult problems about online learning. if I can‘t solve problems by myself，I would ask my classmates and teachers for help，and they may provide some useful advice for me.”

Group B5 “I seek help from classmates or friends through WeChat groups or collect relevant information online.”

Group O1 “Because I felt terrible at home, I came to school in the first semester of my freshman year. Although it is still an online course, the atmosphere of the school has improved for me to some extent.”

Group O2 “I will try my best to prepare several devices before class to prevent network delays, and debug VPN related matters. The most important thing is that we must download the ppt of this class in advance, browse it, and confirm what parts of today’s lectures are divided into and what the order is. This will let me know roughly in advance the rhythm of the teacher’s lectures, even if interrupted, I can quickly recover.”

Group O3 “Make full use of Internet search engines to get additional learning materials, find some familiar students to choose courses together, so that you can communicate with each other about learning.”

Group O4 “I looked up information on the Internet or sent emails to professors. Later, I also tried to communicate with classmates to solve problems.”

Group O5 “First of all, I try to stay in a quiet place so that my mind doesn't wander and I can concentrate better. Then, when finishing the group work, I will contact the team members in advance and make a work plan, so that they can reply to the message

in time, so that we can finish the group work efficiently”

2. How does online learning influence your approach to problem solving?

Group A1 “Become more independent.”

Group A2 “Consult professor or my advisor or my friends for help.”

Group A3 “If it's not online, my usual solution is to get help, get inspired, and work it out on my own. But online learning leaves me to solve problems by myself.”

Group A4 “I think it makes me more independent. Many times I started to tend to solve problems by myself. My information search ability and information sorting ability have been improved. I have more time to think about the possibility of solving problems by myself. During the epidemic, we can only rely on the Internet to collect the information we want.”

Group A5 “In general, the epidemic has improved my ability to solve difficulties and improved my ability to use social communication software. Secondly, the epidemic has also exercised my independence. In the past, I may have been able to get support from my friends and professors, but now, I may choose to solve it by myself first.”

Group B1 “If the communicate is fine it won’t be a big difficulty.”

Group B2 “Online learning is that if an individual is confused in learning, he/she cannot get immediate feedback from the professor, and there is a time lag from having doubts to answering questions.”

Group B3 “We are lacking of emotion feeling, so normally I will not ask for help from teachers or classmates. I will firstly re-read the ppt and find the solutions from

the resources delivered by the teacher."

Group B4 "I think online learning improves my autonomy about problem solving. when i have problems, i begin to think how to solve problems by myself because i cannot ask other people for help than before quickly and conveniently. i tend to communicate with people on the internet more often rather than talk to people face to face to solve problems."

Group B5 "Face-to-face learning used to group discussions because we have plenty of time to discuss. Online learning is more about independent problem-solving. without the help of my classmates, and I needed to solve problems on my own."

Group O4 "Online learning will change the way I solve problems. In general, I prefer to ask the teacher for questions in offline learning, because I feel that the teacher has very rich experience, and he can give me directional answers or help to the questions I put forward. However, in the process of online learning, the way to solve problems is basically to consult the Internet, but this will cause me to search for answers in no direction, which will waste part of my time, and the search results may not be correct."

Group O5 "During the online course, I could only rely on social media to solve the difficulties. When I encountered difficulties, I would search for answers on Google. However, this method was not very good, because there were so many answers on Google that it was difficult for me to recognize which method was the most appropriate. However, in offline courses, the professor can give clear and direct solutions, and patiently explain when I don't know, which can help me save a lot of time."

3. Please share your views on the effectiveness of online learning.

Group A1 “Recordings, you don’t need to worry about miss some key points unconscious.

You can listen the teaching again and again until you really understand it.”

Group A2 “It depends. Online learning is like a double-edged sword. If you are diligent and punctual, then online learning would not be a obstacle for you. Instead, you may take advantage of it, to become more efficient since more flexible time you could allocate. However, if you are unmotivated and lazy, without teachers’ supervision, online learning would for sure became a disaster for them.”

Group A3 “I feel that I can't learn as much from online learning as from face-to-face teaching.”

Group A4 “It's good for me. I have more time to arrange my own study, can review online courses and knowledge at any time, and have enough experience to do some research assignments.”

Group A5 “Personally, I feel that online classes require a high level of self-control. If you can't concentrate, your efficiency and learning outcomes will be greatly reduced. While what’s good for me is tha I will have more time to arrange my own study, can review online courses and knowledge at any time, and have enough experience to do some research assignments.”

Group B1 “Lack of efficiency.”

Group B2 “The effectiveness of online learning varies from person to person. For those with poor self-control, online learning is extremely inefficient, but for those with

good self-control, there is no difference between online and offline."

Group B3 "If the total effectiveness of study learning is 10 points, the online learning is 6 points."

O2 "In fact, efficiency can be divided into two aspects. The first aspect is that the efficiency of the teacher's lectures is actually higher, because the online teaching procedure is simpler when the teaching content is certain, and only needs to tell the content according to the teaching plan. , but for students, the efficiency is definitely lower. First of all, it is difficult for you to have effective interaction with the teacher during the process. For example, sometimes the teacher may not see when you raise your hand to ask questions. Sometimes, you can only communicate with the teacher through emails, and there is no way to have a teaching experience of answering questions."

O3 "Online learning is actually more efficient, because I don't have to run around in school, looking for classrooms, looking for classmates, etc. By saving this time, I can do more things, and the efficiency is naturally higher."

O4 "I think the effect of online learning is very small, because online learning can't stimulate my enthusiasm for learning, and there is no learning atmosphere, which makes me very lazy and always wants to do things that have nothing to do with learning."

4. Which learning mode do you prefer, online or face-to-face learning? Why?

Group A1 "Face-to-face mode. Offer studying atmosphere. Speaking in front of teachers and classmates is a great way to develop your presentation skills."

Group A2 “Face-to-face learning. I like the vibe while having everybody engage in class. The interaction makes everything more interesting and meaningful. I could also gain more experience in collaborating with others in completing a task. That’s also regarded one of the essential abilities in workplace. So, I prefer face-to-face learning.”

Group A4 “Online. More flexible time. I sleep late. Getting up early for offline courses will make me miserable”

Group A5 “I prefer offline classes, because I can concentrate more on listening to the get out of class, and have a better sense of experience and participation.”

Group B2 “In my opinion, offline face to face is the best way to attend class, because face to face can focus more on learning, reduce the disturbance of other aspects, and at the same time, it can contact with classmates and professors in a timely manner, and seek answers to their doubts.”

Group B4 “I prefer face to face learning. Because I can go to campus to attend classes, see my classmates and teachers, join some outdoor learning activities, which make me feel happy and I can feel my study life in the university is real and meaningful.”

O2 “It must be online teaching. Offline teaching is good for both students and teachers. Teachers can concentrate on teaching without having to take care of technical issues, while students will feel more in offline teaching. The classroom atmosphere will make them more focused on learning, and they can Interact with the teacher in time, but for online teaching, it does not have the above advantages.”

5.4.2 Social Presence

When the participants describe their online learning experience, most of them holds the views that online learning lead to bad emotions and feelings. However, most of them believe online learning having both its advantages and disadvantages. Group A and Group B participants of focus group and one-no-one in-depth interviews participants who are named as from O1 to O5 answer the questions as following:

1.Please describe your online learning experience?

Group A1 “Online learning is easy to be disturbed.”

Group A2 “Talking about virtual learning’s study outcome and efficiency, I think it all boils down to self-discipline. For most of the online classes, we don’t necessarily need to open the camera, which means there’s no supervision, which provides a grey area for students to goof off. Eventually, they might learn nothing at the end of the semester. But I think I’m an exceptional case, I did attend every single lesson on zoom these two years. One thing I appreciate while having class on zoom is that it’s far more convenient for us to re-watch the lecture recording after lessons to do revision and further consolidation about the knowledge. And my time schedule was much more flexible comparing with offline teaching, as I didn’t need to spend much time on transports. Rather I could use them to do homework, read books so on. However, on the other head, it was quite inconvenient for me to borrow books from school libraries. I do prefer reading an actual book instead of e-book online. One common scenario in zoom classes is less interaction, relatively less people were willing to speak up on a virtual platform.”

Group A3 “My online learning experience is not good. Because of online learning, I can't participate in many extracurricular activities, which leads to my bad attitude and indirectly affects the quality of my learning.”

Group A4 “Even though the school has provided a dual regulation system for some time, most students still choose online classes. I personally feel that the personal time arrangement during online classes is very free, which can save me a lot of personal time. However, due to having classes at home, I sometimes let myself relax too much, leading to distraction.”

Group A5 “In my opinion, the advantage of online class is that it is very flexible and free, but the disadvantage is that it is easy to be distracted, and it is very inconvenient to communicate with teachers and classmates.”

2. How do you feel the social anxiety when you study online during COVID-19?

Group B1 “It has two side; one is it’s easier for me to connect with the school. However, if I cannot see the classmates and the lecturer, I will be nervous”

Group B2 “The biggest social anxiety is that the quality of the professors’ courses is not guaranteed, and that they will wander and lose concentration because they are not face to face.”

Group B3 “For me, the social anxiety is how to complete a team-project. We need find team-mate from the group chat, and we seldom found time to discuss the project, we only did the part assigned by myself. It must influence the team-project quality”

Group B4 “I think there were two things to feel the social anxiety during Covid 19. One was the inadequate cognition of Covid 19. The other was that people cannot

judge whether the method to deal with the virus was right. So, the outbreak of COVID-19 made people feel anxious, they feared they may infect with the virus and they did not how the virus would influence people ‘s health. So, we tended to find some conservative approaches to avoid crowds gathering and reduce social activities. Students cannot enjoy the academic atmosphere in the university freely and there was less face to face interaction between students to discuss study. Anxiety was inevitable.”

Group B5 “Sometimes I feelings of loneliness, as I might be avoiding classmates and friends.”

3.If online learning causes your psychological anxiety, what would you do?

O1 “No effective measures have been taken.”

O2 “Personally, I feel that the social reaction to COVID-19 is not very remarkable, but more of an attitude of tolerance and trying to adapt. For online classes or online offices, people can only try to be less anxious and forced to accept it in a peaceful state of mind. However, there is still a certain sense of anxiety about the inconvenience caused by quarantine and various epidemic prevention measures. In particular, the extent of economic damage caused by the epidemic makes many ordinary families face great living pressure. Online classes for me may not be too much pressure, just a change of place to learn in a different way.”

O3 “I think I would get out of the Internet environment and go out for a while even if I could get infected.”

O4 “I will go out for a walk, have a breeze, see different street scenery, moderate stress relief.”

O5 “If online classes cause me psychological anxiety, I may release the anxiety in some happy way. For example, to divert my attention, I can go hiking with my family or watch movies and travel with my classmates, because when I enjoy the happy process, I will forget the unhappy things.”

4. What do you think online learning challenges that you face during COVID-19?

Group A1 “It’s hard to interact with groupmates and professors. The unsteady internet connection usually causes we miss some key points of lectures.”

Group A2 “Unstable WIFI. Lots of temptations and it is difficult to concentrate during lessons.”

Group A3 “The biggest challenge for me was not being able to discuss it with professors. Because the professor's guidance has a great enlightening effect on my study.”

Group A4 “I think it's group work. Because online cooperation is always a difficult thing, and everyone’s ideas cannot be well displayed to everyone. Although there is video conference, it still makes people feel bad.”

Group A5 “I felt that the epidemic has made it difficult for me to communicate with teachers. Many old professors they are not adapt to using electronic communication tools. If you encounter problems with the course, you can find them offline originally, but under the epidemic, you can only communicate by email, so the efficiency becomes lower.”

5. Please share your views on online learning course self-expression, communication and collaborative.

Group A1 “Provide the platforms for us to communicate, and we should make full use of them. It’s a test for our self-supervision.”

Group A2 “Because of online learning, we relied too much on technology, which brought some drawbacks to us. For instance, the ability to memorize stuffs. For English presentation, I would just look at the script I typed on screen. Therefore, it made me extremely nervous while doing the same thing again in a face-to-face lesson. As memorizing stuffs was no longer a usual practice for most of the university students due to pandemic. That’s the problem I figure out in self-expression. Demand on communication and collaboration is relatively higher. Moreover, I think it’s awkward for me to talk with strangers as we trapped at home for a thousand years. So, I find it weird to start a conversation again in real practice.”

Group A3 “I think online learning will reduce self-expression, communication and cooperation. Because the online course uses Zoom, when the teacher asks questions, people are less likely to take the initiative to answer questions with open mic because there is no glance from the teacher. I don't feel embarrassed to answer questions without turning on the microphone. So, the opportunity for self-expression is often missed. In fact, group presentation is a good opportunity to communicate and cooperate with classmates. If you are online, because you can't see your classmates, you can't get in-depth communication.”

Group A5 “It's good for me. I have more time to arrange my own study, can review online courses and knowledge at any time, and have enough experience to do some research assignments.”

5.4.3 Teaching Presence

Most of the participants believe that the content of online teaching has not been properly changed, the course content is monotonous, and there is only theoretical teaching and learning. They think that professors should abandon some traditional teaching methods and adopt more new methods instead of just reading PPT. Most participants believe that there are actually more types of course materials for online classes than face-to-face mode. Most participants believe that even after the epidemic, it is recommended to keep online teaching and teaching videos or recordings, and students suggest that online learning can become an auxiliary mode for face-to-face learning. Some participants respond the interview questions as following,

1. Please share your views on online learning course content, learning activities and schedule?

Group A2 “During zoom class, obviously less discussion for the tutorial classes. The learning activities were quite dull and based on the learning materials, like we would type our answers in the chat box and double-check with teacher’s standard answers, but no discussion and further elaboration. Mainly input, the absence of output button.”

Group A3 “I think for online learning, the schedule is even more important than the content. Because online learning, seems to be a lot of time, because it seems to save time on the road, chatting time. But that's not really the case. Because the online learning time is flexible, I often feel like I have a lot of time. Sometimes I do other things unconsciously.”

Group A5 “Compared with offline classes, there is not much difference in course content and learning activities. However, the course schedule is obviously much more generous, the time that can be freely arranged has increased, and it is more flexible.”

O1 “Online courses reduce the overall difficulty of coursework and reduce the number of activities available to study. Because it can't be carried out offline, such as doing experiments that cannot receive data.”

O2 “In my opinion, there are no appropriate changes in online teaching content, such as the offline division of lecture and tutorial, which can be slightly adjusted online. Since everyone used to turn off the microphone and turn off the camera in lecture, the teacher can talk about some theoretical knowledge, but the tutorial requires participation, so some important topics in lecture can be discussed in the tutorial. Online will leave a lot of room for students to cheat and cannot verify the authenticity of teaching.”

O3 “The course content is a little monotonous, only theoretical learning, some practical activities of the course cannot be taken, it is a pity. But the timing is more reasonable, as teachers will understand students' psychological problems during COVID-19 and reduce their workload.”

O4 “Online learning can give you more control over your time, and you can have more free time to do things. For example, in the morning, there is plenty of time to cook breakfast before the morning class, because you don't need to rush to class or even start the class in your pajamas.”

O5 “In my opinion, the course content during the online course is very interesting.

In order to avoid boring teaching methods, professors often design some interesting teaching modes. For example, they will use Kahoot to complete some course contents and reward the first place, which greatly motivates students to answer questions and promotes effective communication with professors. For another example, when I studied ADA's beginner course, the professor not only taught us some necessary skills of composition, but also taught us how to draw the patterns we want."

2. How do you utilize the online learning courses materials?

Group A1 "preview and review."

Group A2 "For pre-lesson and revision."

Group A3 "Online learning materials are great learning materials. I can open the material anytime and anywhere to study or review. In addition, online learning materials can be reused. If a knowledge point is not learned in class, it can be learned infinite times after class until it is learned. In a way, I actually like this aspect of online learning."

Group A4 "As usual, but online learning materials are more detailed and rich."

Group A5 "I always reviewed the screen recording of the online class, I think it is very helpful to grasp the knowledge."

Group B4 "I would read and identify the online learning course materials seriously to understand some important knowledge points that teachers emphasized, and I would utilize these materials to find more extracurricular materials to help me understand the knowledge well and broaden my horizon. When I have trouble in learning，I would discuss with my classmates about these online learning course

materials, and these materials are necessary for the tests."

Group B5 "Before class, I would log on to Moodle and download the PowerPoint in advance for pre-reading. When I had questions about the course content, I would watch videos of the parts I didn't understand at the end of the course."

3. Please share your views on the online learning courses materials.

Group A1 "There are more kinds of forms or types of materials."

Group A2 "Thumb ups to video recording clips."

Group A4 "I think the most helpful is the course video. Especially for some professional courses that need recording operation, I can watch the videos repeatedly."

Group A5 "I think online learning materials are of great help to online courses and should not be ignored. Schools should enrich diversified online learning materials, not limited to course recording."

Group B4 "For materials, sufficient to help students but students may not read all the materials without the guidance and help of the teachers. sometimes students don't know how to deal with so many complex online materials."

O2 "Slight adjustments can be made, such as dividing the ppt into two versions, sending theoretical knowledge to Moodle in advance so that students can study by themselves in advance, or conduct secondary study after class. What is more important in class is that the teacher can focus on a certain point or a few points in the reading for detailed discussion and research to help students understand theoretical knowledge."

O4 "In fact, there are more types of online learning course materials than offline ones. For example, when teaching online, professors will record classroom videos and

leave them for students to watch, but only a small number of teachers in offline courses will do so. So online learning may be more abundant in terms of learning resources."

4. Please share your views on the role of online learning in learning and teaching?

Group A1 "Supplementary and alternative teaching mode."

Group A2 "The teaching strategies were limited on zoom, Q&A only. For learners, most of them are shy to express their difficulties in learning. Thus, they won't be able to thoroughly understand the concepts."

Group A3 "I think they are not contradictory; they can exist simultaneously. For example, students study offline, but the professor also takes a teaching video and puts it online, so that students can not only study offline, but also review the video online after class."

Group A5 "Online classes can be used as a supplement. Online mode can make the course model more flexible, but it cannot completely replace offline classes."

O2 "In fact, online teaching can play a very good auxiliary role. What I have always advocated is that teachers should save the recording and upload it for students to review later. This will allow students who are willing to learn to understand the content of the class at multiple levels and understand it from their own perspective. Offline teaching is still the main means."

O3 "After the epidemic, I think online learning can become an auxiliary mode for offline learning. Some parts that require individual tutoring, or activities that do not require everyone to attend the meeting, can be done online to reduce time costs, or to organize group learning online. But the main teaching and learning means should still

be offline learning.”

5. If you could improve online learning in your class, what they would be?

Group A2 “Diverse and interactive learning methods, like game and drama etc. Utilize the breakout room function for more group presentation and projects.”

Group A4 “I think it is a dual track teaching system. Students can choose online or offline classes independently. At the same time, all students are provided with course videos, but the examination must be offline to ensure fairness.”

Group A5 “Let more students take turns to speak online, not just teachers speaking to the screen.”

Group B2 “I think I will optimize the network stability of online learning, the functionality of software and the UI design of online meeting people's interaction.”

Group B4 “I think teachers can conduct more colorful and creative online activities to encourage students to join the classes，not just to read and explain the contents of ppt and the teachers can collect students‘ opinions about online learning and give students feedback to solve problems regularly.”

Group B5 “A sign-in system should be implemented before class to ensure that students are present in the classroom, and students should turn on the microphone and camera as much as possible at their convenience, similar to the "face-to-face" conversations, which solves the problem of teachers not knowing whether students are participating or not.”

O1 “Add more interactive activities, force everyone to turn on the camera, etc.”

O2 “More theoretical knowledge will be recorded as recording to reduce the

invalid time of online teaching, and more time will be spent on tutorial discussion, and at the same time arrange some interesting forms to help students reduce boredom."

O3 "I will try to use more advanced online education software to improve teaching efficiency, for example, to promote the use of teams software in English courses (because subtitles and translations can be provided in real time), or to collect more trendy teaching materials through the Internet to attract student interest."

O4 "I think it should be to turn on the camera and take wide-angle photography, that is, not only can see a face of the students, but can see the surrounding environment and what the students are doing, so that at least the teachers and students can be guaranteed their continuous interaction."

O5 "I think professors should abandon some traditional teaching methods and adopt some new methods, such as using games to increase the interaction with students, and do not use long text descriptions in the courseware, and in some cases, use video and picture display Knowledge points are more efficient. Then I think that students need to create study groups to monitor their own learning progress, which can also enhance the relationship between students."

6. What suggestions will you give to your teachers for improving online teaching in your class, what they would be?

Group A1 "Class design can be more interesting and create more colorful in-class activities. Teachers should be more familiar for the operation of computer, save much time. The rubrics should be clear. Track students process more regularly, send the in time."

Group A2 “Different channels of teaching materials, like some visual stimulation so that students won’t fall asleep in non-stop 3 hours lecture.”

Group A3 “I would advise teachers to divide long lectures into multiple sections to avoid distracting students. You can also try to ask more questions in class to provoke students to think. In addition, Office hour will be increased so that students can have more time to discuss with teachers.”

Group A5 “Teachers’ skills in using electronic devices should be strengthened, especially those old professors who have difficulty using computer, so that they can at least master basic skills and operations.”

Group B2 “Concentration is important. Some students will turn to other things in class and ignore the class, resulting in the knowledge in class cannot be well communicated to some students.”

Group B4 “Ensure the online equipment function well， and teachers can communicate with students smoothly teachers can tell students to prepare and utilize the online learning materials for class and raise questions in advance. Ask the monitor to check students’ attendance and ensure the attendance rate teachers can divide the students into different groups and take turns communicating with a group every week to know students’ opinions towards the online learning and solve the problems·”

Group B5 “Professors should use advanced technology in the classroom. For example, students can experience “immersive” learning by using technologies such as VR and AR to connect with the teacher at a fixed time.”

O2 “First, don't just read the ppt, which wastes the time. Second, flexibly record

attendance and pay more attention to classroom performance. Third, increase the fun of teaching in the form of games, group cooperation, competitions, etc."

O3 "Choose the subject closer to life, with some network hot spots and social news to design teaching, that can attract students' attention. At the same time to ensure that their own network environment is good, otherwise students will have a poor learning experience."

O4 "First, turn on the camera and take a wide-angle shot. Second, hold more communication meetings to ensure that each student knows his or her goals and that the professor knows more about the status of each student."

O5 "Professors should choose more novel teaching models to make students focus their attention."

5.5 Data Analysis

The collected transcripts data is coded according to community of inquiry template which is mention in previous section. Following the principle of constantly comparing words and sentences to analyze and code the transcripts to find out the sentences that affect the students' attitudes towards online and face-to-face learning during epidemic period, and then set them as codes to form 393 indicators at last. The coded data based on Community of Inquiry Framework can refer to the following table,

Elements	Codes （Part of 393 codes）
Cognitive Presence	independent，solving problems by myself，inefficient，lack of efficiency，course recordings，Moodle，cannot concentrate，self-control，provoke to think，preview and review
Social Presence	chat software，social media，video conference，feel bad，anxiety，furious，feelings of loneliness，nervousness，worried，not good，frustrated，emotional isolation and loneliness，very free，flexible，adjustable and convenient，hard to interact，a lot of trouble in coordination，no social communication，can't get in-depth communication
Teaching Presence	teachers，professors，ask for help from teachers，cannot get immediate feedback from the professor，studying atmosphere，open mic and camera，ask more questions, not only read PowerPoints,more time for students discussion,more interesting activities, basic skills and operations of computers,advanced technology,VR and AR,auxiliary role

TABLE 2. Part of Coded Collected Data

5.5.1 Cognitive Presence

The words “independent” and the phrase “solving problems by myself” have high frequency of appearance and the relevant words, phrase and sentences appear 14 times that account for 3.6%. The relevant words “inefficient” and the sentences “online learning is lack of efficiency” and relevant phrases appear 14 times that account for 3.6%. The words or phrase or sentences relevant to “course recordings”, “Moodle” and “course video” appears 28 times that account for 7.1%. The words or phrase or sentences are relevant to “need self-control” appears 11 times that account for 2.8%. The words or phrase or sentences are relevant to “distracted” “cannot concentrate” appears 17 times that account for 4.3%. The words or phrase or sentences are relevant to “consolidate knowledge” “provoke to think” “preview and review” appears 15 times that account for 3.8%.

5.5.2 Social Presence

The words or phrase or sentences relevant to “chat software”, “social media”, “Video conference” appears 10 times account for 2.5%. Participants usually communicate with their teachers and classmates through chat software, such as WeChat, Zoom and other video conference software. The words or phrase or sentences are relevant to “feel bad.”, “anxiety.”, “furious”, “feelings of loneliness”, “nervousness”, “worried”, “not good”, “frustrated”, “emotional isolation and loneliness” and “nervous” appears 26 times that account for 6.6%. The words or phrase or sentences are relevant to “flexible”, “very free”, “flexible”, “study at any time and

any place", "adjustable and convenient" appears 16 times that account for 4.1%. The words or phrase or sentences are relevant to "hard to interact", "a lot of trouble in coordination", "no social communication" and "can't get in-depth communication" appears 45 times that account for 11.5%.

5.5.3 Teaching Presence

The words or phrase or sentences are relevant to "teachers", "professors", "ask for help from teachers", "cannot get immediate feedback from the professor" appear 14 times that account for 3.6%. The words or phrase or sentences are relevant to "studying atmosphere" appears 9 times that account for 2.3%. The words or phrase or sentences are relevant to "strongly suggest to require open mic and camera", "students should turn on the microphone and camera", "teachers should ask more questions" appears 11 times that account for 2.8%.

The words or phrase or sentences are relevant to "Let more students take turns to speak online, not just teachers speaking to the screen" "teachers should not only read PowerPoints" and "teachers should not just to read and explain the contents of ppt" appears 8 times that account for 2%. The words or phrase or sentences are relevant to "Track students process more regularly", "provide more time for students discussion", "teachers should prepare more interesting activities", "make class interesting" and "teachers should prepare more colorful and creative online actives" appears 23 times that account for 5.9%.

The words or phrase or sentences are relevant to "Teachers' skills in using

electronic devices should be strengthened", "teachers should master basic skills and operations of computers", "professors they are not adapt to using electronic communication tools", "Teacher should be more familiar with the operation of computer, save much time" and "teachers should try to pay attention to the composition and clarity of blackboard writing" appears 7 times that account for 1.8%.

The words or phrase or sentences are relevant to "should use advanced technology" and "VR and AR to connect with the teacher" appears 33 times that account for 8.4%. The words or phrase or sentences are relevant to "the network is not stable", "unsteady internet connection" and "network stability of online learning" appears 7 times that account for 1.8%. The words or phrase or sentences are relevant to "Online learning can be as supplementary and alternative teaching mode", "After the pandemic, I think online learning with courses recording can be a supplement to offline learning" and "Online teaching can play a very good auxiliary role. I always advocate that teachers should save the recording and upload it for students to review later" appears 11 times that account for 2.8%.

6. FINDINGS

According to the data analysis, this research finds that the students' attitudes towards online and face-to-face learning are mainly reflected from five aspects. They are: 1). basic qualities of teachers, 2). instructional design, 3). instructional resources, 4). interaction between teachers and students, and 5). instructional mode.

6.1 Basic Qualities of Teachers

In the data collection of this study, the reference points of teachers' basic qualities accounted for 35% of the whole coding reference points, as shown in the following chart,

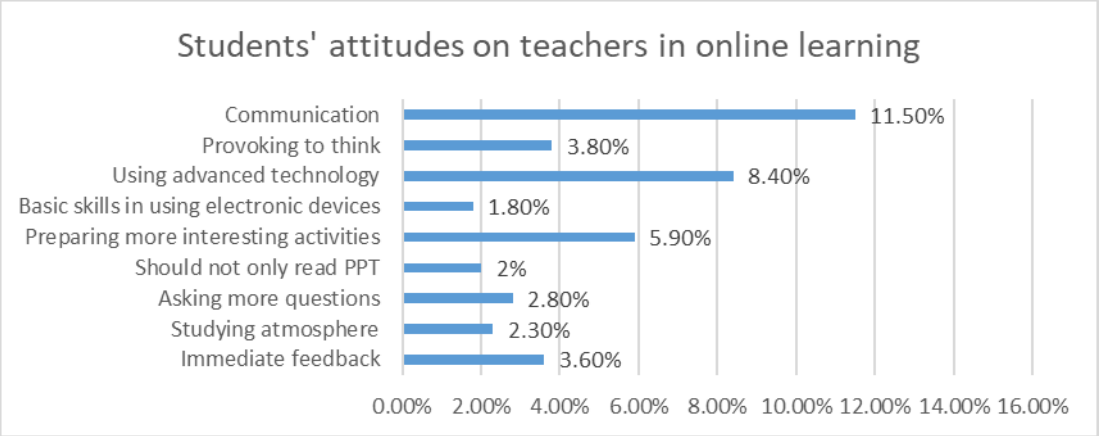

FIGURE 4. Students' attitudes on teachers in online learning

According to the existing data of this research, students believe that teachers play a very important role in helping them solve problems, and the interaction and communication with teachers are very important. Students hope to get timely feedback

from teachers when they encounter problems. The students hope that teachers can create a better learning atmosphere in online learning, forcing all students to turn on cameras and mics and taking wide-angle photography to help them focus, increase their learning motivation and improve learning efficiency. Clear curriculum arrangement and appropriate teaching methods and means are the most mentioned in the description of excellent teachers. Excellent teachers can grasp the key problem in class, with concise and fluent language, clear thinking and clear blackboard writing, which can accurately convey the main content of the course and promote students to think and understand deeply.

In addition, the pace of teaching in some classes is too fast, which makes it difficult for students to synchronize with the pace of teachers. In addition, online learning lacks guidance, and the online learning effect is relatively poor. Students believe that such online courses need to be improved. The quality of teachers is also reflected in the skillful operation of online teaching and learning equipment, teaching resources and digital technology, classroom interaction, teaching and other aspects. Students suggest that teachers' skills in using electronic devices should be strengthened, some professors who have difficulty in using computers and the teachers should at least master basic skills and operations on digital technology. Students can feel whether the teachers have rich knowledge experience and solid knowledge foundation through the speech and behavior of the teachers, and prefer the teachers with rich academic reserves and keeping pace with the times.

Therefore, it can be concluded that students in online learning class have high

needs on communication, interesting activities and interaction for their teachers. Furthermore, students express their dislike on teachers PPT reading. That shows that arouse students' learning enthusiasm to participate in interaction is very important. Moreover, online learning has high requirements on advanced technologies operation for teachers that makes teachers have to become lifelong learners.

6.2 Instructional Design

It is also can be found that students have high needs for communication, applying advanced technology in learning process, using course recordings and more interesting activities among students' attitudes on instructional design in online learning. A number of students hold online learning can be auxiliary role when teachers design class even after the pandemic They also suggest teachers should not only read PPT and should ask students more questions and create studying atmosphere which help students actively participate in discussion and concentrate on learning.

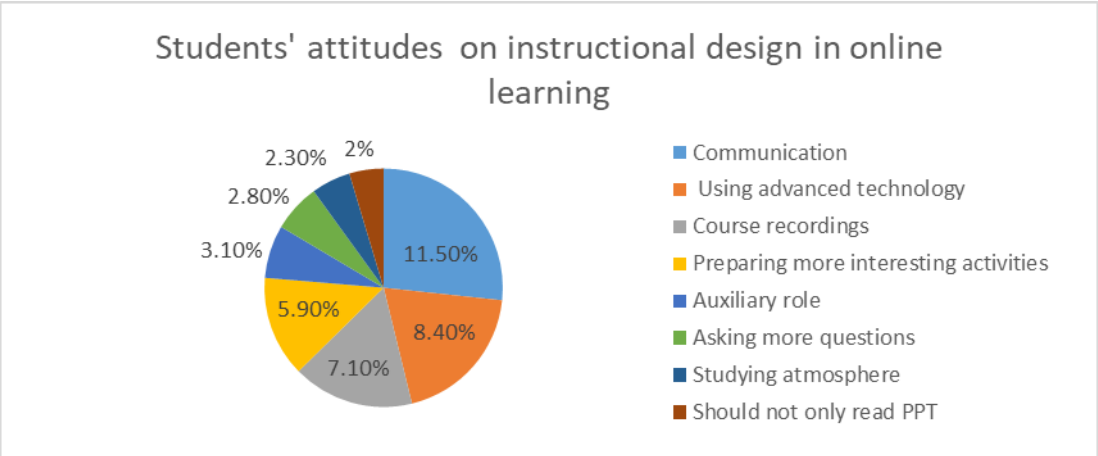

FIGURE 5. Students' attitudes on instructional design in online learning

The data also indicates that course recordings are very popular among students though online learning has some shortcomings. The students strongly suggest retain course recordings in instructional design even after the pandemic. Because they could review the videos after class for consolidating what they learn in class and examination preparing. The students are eager to more digitalized and intellectualized classroom.

Students hope that teachers should not read and explain PowerPoint only and should give students more opportunities to discuss and speak. Just one of students expressed that during zoom class, obviously less discussion for the tutorial classes. Students think that the learning activities were quite dull and based on the learning materials, like they would type our answers in the chat box and double-check with teacher's standard answers, but no discussion and further elaboration. Mainly input, the absence of output button. Teachers should abandon traditional teaching methods and adopt some new methods, such as using games to increase interaction with students, using videos and pictures to show knowledge points, and using digital technology to choose more novel teaching modes and more advanced online education software to improve teaching efficiency and to get the students to pay attention. It shows that students are eager to enjoy advanced digitalized classes.

Students hope that teachers can use examples that are closer to life, and use some Internet hotspots and social news to design course, which can attract students' attention more. They suggest that teachers could apply diverse and interactive learning methods, like game and drama etc. Let more students take turns to speak online, not just teachers speaking to the screen. Classes design can be more interesting and create more colorful

in-class activities. Students also suggest that teachers can divide long lectures into multiple sections to avoid distracting students and can also try to ask more questions in class to provoke students to think.

In addition, office hour should be increased so that students can have more time to discuss with teachers. Too much theoretical knowledge makes students lose interest in online learning. Tasks with moderate difficulty and combined with practice can arouse subjective initiative of students Besides those above mentioned, students hold that the teachers should force all students turn on cameras and microphones and attendance could be as teaching means to urge students in online teaching, combined with other teaching activities, can form a better virtuous circle.

6.3 Instructional Resources

Some materials provided to students by teachers for teaching, including videos, documents, courseware, websites and other content. Teachers prepare courseware, videos and other resources to help students learn before class. Overall, the data shows that students have positive attitudes on instructional resources in online learning. Most of students indicate that online learning materials are great learning materials. They can open the materials anytime and anywhere to study or review.

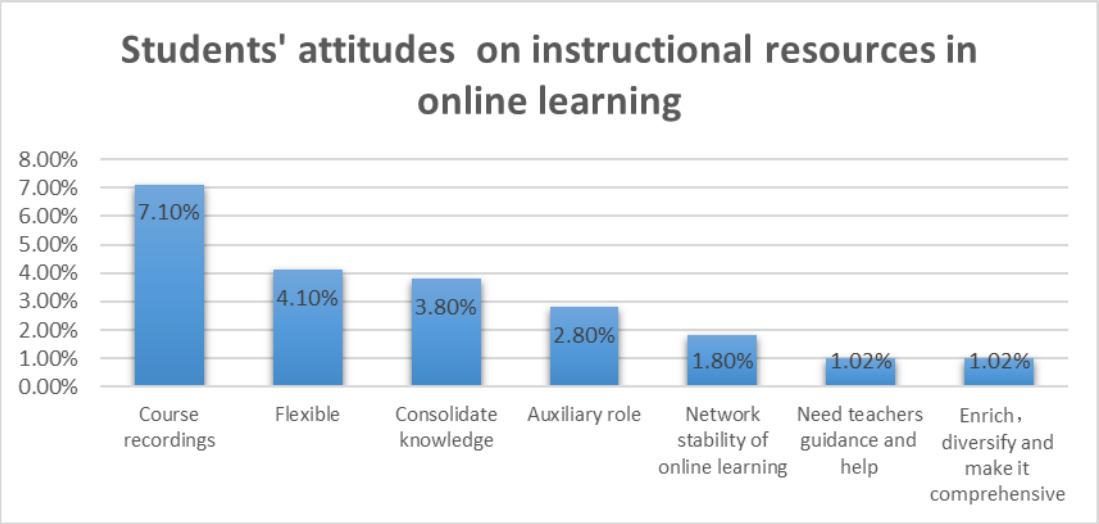

FIGURE 6. Students' attitudes on instructional resources in online learning

In addition, online learning materials can be reused. If any knowledge point is not learned in class, it can be learned infinite times after class until it is learned. In this way, most of students like this aspect of online learning. Most of students would read and identify the online learning course materials seriously to understand some important knowledge points that teacher emphasized, and they would utilize these materials to find more extracurricular materials to help them understand the knowledge well and broaden their horizon. When they have trouble in learning， they would discuss with their classmates about these online learning course materials, and they believe these materials are necessary for the tests. Other students suggests that the teachers should enrich diversified online learning materials, not limited to course recording.

Some students hold the view that online learning materials is sufficient to help students but students may not read all the materials without the guidance and help of the teachers. Sometimes students do not know how to deal with so many complex

online materials. Besides that, some students suggest that the network stability should be improved, otherwise many works will be forced to delay or extend working hours, which makes many online learning become time-consuming and inefficient.

Online learning material should include activities. Therefore, learners could choose suitable learning activities according to their own preference. The learners who tend to learn from specific experience more like to the concrete examples and activities that they could involve to participate in it. They interact and connect with peers more than those authority people. They like group work and are happy to receive feedback from peers. In their point of view, the teachers are their coaches or helpers. If the teachers use the teaching methods through providing more support to them, allowing them to interact with peers and giving them guidance, they would prefer to accept.

All in all, students hold that online materials are flexible and can help them consolidate what they learn in class. Most of students very relay on course recordings. They suggest that online materials can be used as auxiliary role and the students need their teachers' guidance and help on online materials using, especially when they face so many complex online materials. They also suggest the online material should be enriched, diversified and comprehensive.

6.4 Interaction between teachers and students

Most of students believe that communication or interaction in online learning is one of the main problems. Though online learning is flexible and break space and distance barrier, distance barrier still leads to lack of commination and hard to interact

in online learning. Students need teachers' immediate feedback, however, students indicate that hard to be realized in online learning because of different kinds of reasons, such as internet connection, teachers didn't see the questions from chat box, the students reluctant to use microphone to ask or have no chance to ask, etc. The students don't want to communicate with their teacher through video conference and they also indicate that the teachers should not only read PPT. They express that all those lead to inefficient interaction between teachers and students. They suggest the teachers should ask more questions for adding more interaction between teachers and students.

Data analysis showed that students considered courses with less interaction to be poor classes. Less interaction is reflected in the lack of communication with students, students do not have chances to answer questions, discussion, etc. Teachers provide timely answers and help to solve students' questions and perplexities, respect students' views and allow students to speak freely, which can promote the collision of ideas in class and improve students' learning efficiency. It can be seen from students' statements that students prefer teachers with moderate tasks, more interaction and timely and effective feedback.

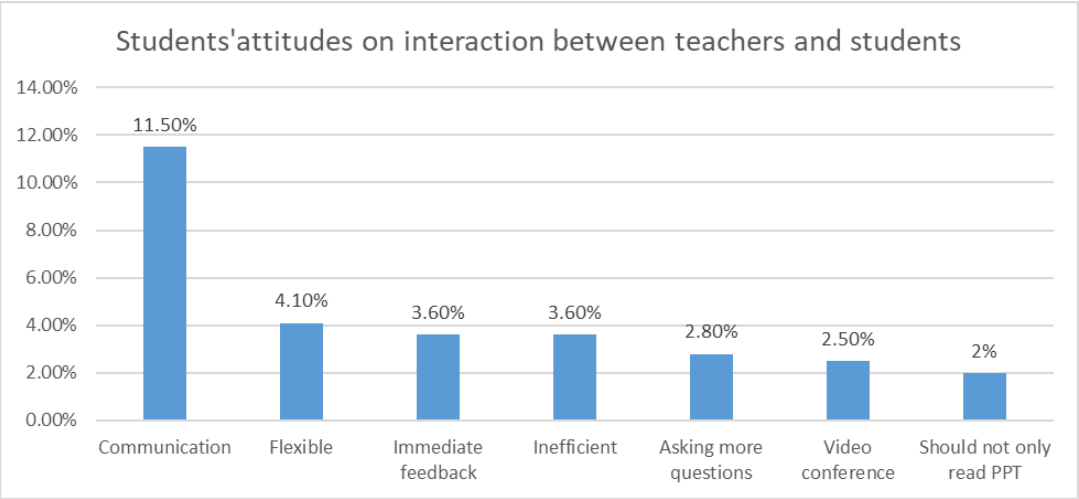

FIGURE 7. Students' attitudes on interaction between teachers and students

Students suggest that the teachers could utilize the breakout room function for more group presentation and projects as well. the interaction between teachers and students in online classes should be strengthened. Students hold that they should be encouraged to participate in activities actively. Even online learning, extracurricular activities can relieve students' pressure. Some students are too shy or unsure of their answers to participate in activities, so professors can open up comment sections in online learning so that students can participate in discussions anonymously and openly. Students indicate that online learning can provide more time for answering questions and discussion.

6.5 Instructional Mode

In terms of teaching mode, students prefer to face-to-face communication but they also enjoy flexibility, course recordings for consolidating knowledge and video conference tool of online learning. The students are more inclined to have online

classes during pandemic, face-to-face communication with teachers for ask questions, and then review and consolidate knowledge through course recording after class.

The students suggest that online and face-to-face learning are not contradictory and the two modes can happen synchronously. They indicate that online learning could be used as an auxiliary mode for face-to-face learning, which could be retained even after the pandemic.

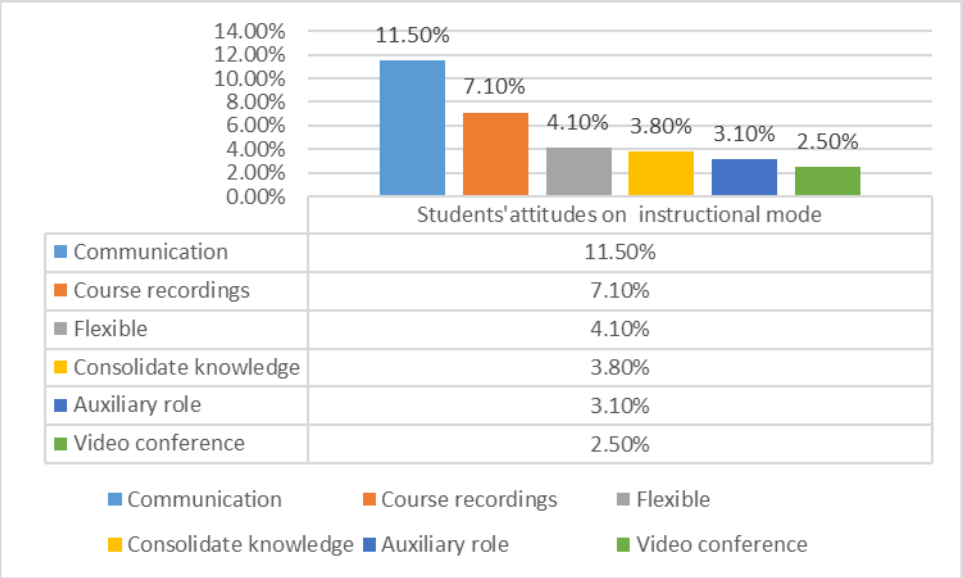

FIGURE 8. Students' attitudes on instructional mode

As it is shown in the above chart, it can be seen that the combination of theory and practice, live broadcast and video broadcast is more popular among students. In the data analysis of students' attitudes on instructional mode, quite a few students suggest that teachers should save the recording of the lessons and upload it for students to review after classes.

Students indicate that online learning can be supplementary and alternative

learning mode. But they more prefer face-to-face class. They believe that online classes cannot completely replace offline classes. Online mode can be a supplement. The students hold the view that online and face-to-face learning are not contradictory. They can exist simultaneously. The data analysis indicates that students prefer study offline, but they also hope the professor take a teaching video and puts it online, so that students can not only study offline, but also review the video online after class.

Therefore, online and face-to-face integrated learning mode is just what the students are looking for. But the integration is not the blended of online and face-to-face learning modes simply. It should be balanced and adjusted the integration portion according to different instruction situations, aims or outcomes, etc.

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7. DISCUSSION, POLICY IMPLICATION AND CONCLUSION

7.1 Discussion

From traditional face-to-face learning to online learning and blended learning, that is a long history and process. Anderson (2008) is a professor emeritus of Athabasca University. He edited and published a book regarding on online learning theories and practice. Mohamed Ally is one of authors of the Anderson's book. Ally works at Athabasca University. She specializes in researching on distance education. She claims that education theory lays theoretical foundation for online learning development. She wrote that scholars have long debated the impact of specific delivery technology on improving learning. Some scholars suggest that technology is only teaching delivery tool and it cannot influence students' scores and performance.

Ally quoted Bonk and Reynolds (1997) that impressive activities should be applied in online learning so that it could help students to connect the new information to old information and the students could achieve consequential learning and adopt metacognitive competence. From that aspect, therefore, the two scholars conclude that it is the teaching strategies impact on students' achievement on learning and scores rather than the technology, such as computer media. Ally cited description of Kozma (2001) that the computer should simulate real life scene for students through special properties of computer. Ally wrote that the computer indeed impact on students learning. At the same time, Ally also quoted that Kozma also believes that it is not the computer itself influence students learning but the real-life simulation and the

student's interaction with the real-life simulation help students' learning. And the computer is only a tool that can deliver the teaching instruction and possessing the processing attribute and nothing more.

In the book of Anderson (2008), Ally discussed time and space issues of online learning. As Cole (2000) said that online learning is flexible that can be used regardless time and space. However, almost perfect teaching instruction design is required when using computer as a delivery way. Ring and Mathieux (2002) claim that highly authentic impact on online mode, highly interactive and highly collaborative. Highly authentic means that students should learn in a learning or work environment. Ally suggests that successful online learning and online learning materials should be based on educational theory as foundation. Meanwhile, Ally proposed an online learning instruction model according to relevant educational theories.

Ally found phenomenon that educational organizations tend to adopt online learning both at schools and at a distance. For those educational organizations, they realize the benefits of online learning both for learners and instructors. For learners, Ally claims that it could be regardless time, location and distance for nonsynchronous condition, no matter when, online learning can help learners to get online learning materials.

For synchronous condition, online learning can offer real-time communication among learners and teachers. The learners can get the latest relevant knowledge and learning materials through internet and they also can communicate and learn from the experts of relevant fields. Ally believes that online learning can provide learners

situational learning and it can promote leaners to apply knowledge and skills in a certain context. The learners can complete their learning at their work place and their own space. Online learning can help learners in real-life simulation learning environment.

For the instructors, they could arrange tutorials at any time and any location. The instructors can update the learning materials anytime and the learners can know the changes in time. The learners can access to the learning materials through internet and the instructors can tutoring the leaners according to the learners' learning needs that make learning easier than before. According to Ally, online learning could be designed and applied for confirming learners learning needs and the learners could select their learning materials according to their learning needs so as to achieve their expected learning outcomes.

Ally believes that it is important to properly design online learning materials. Ally agrees Rovai (2002) who claims that the objective of any teaching system is prepared for promoting learning. Hence, when the online learning materials is planning, the teacher should clearly know and understand learning principles and the students how to learn. The online learning materials should be developed according to the learning theories which are proved and well established. As the above reasons that Rovai listed, Rovai believes that deliver medium such as computer is not the determiner of online learning quality. On the contrary, online learning course designing determines the effectiveness of online learning course.

Ally found that there are a lot of schools of thought about learning. However,

there is not any special school of thought on online material designing. Ally proposed that because of no particular learning theory to abide by, the online learning materials can be developed by comprehensively applying different theories. What's more, as the research further develops, new researches develop new theories which come up and are used and developed further. Ally considers that connectivist theory is a good example among those new theories. That theory serves the emerging age because it is fit for distance learning and online learning through internet.

However, some researchers are suspicious of the necessity of new learning theories, especially on the condition that sound learning theories have been applied in designing instruction or teaching successfully. In addition, the learning theories of past time have been fit for new and continuous changing learning environment. However, the present learning theories are established and developed by educators before the distance and online learning, and they are applied broadly by educators.

Ally proposed that online learning course developers should have knowledge of different ways of learning so that they could select the most suitable instruction strategies. The instruction strategies should select those that can inspire learners, easy to process in depth, promote individual development in all aspects, meet the needs of individual differences, and facilitate learning significance. Meanwhile, Ally claims that materials should be designed according to different schools of learning theories.

Thorndike (1913) believes that the early computer learning system is a kind of learning approach developed on the basis of behaviourist. Behaviourists indicates that learning is a kind of behaviour that can be observed. Moreover, that observed learning

behaviour also shows whether the learners have learned knowledge instead of what the learners are thinking of in their heads. However, some educators declare that not all learning can be observed and learning is not only the change of behaviour. Therefore, the scholars start to shift their researches from behaviour learning theories to cognitive theories of learning.

Ally claims that some theorists on cognitive consider that learning is an internal process and they advocate that the measurement of learning lies on learners' capacity of processing knowledge, the learner' effort put in the learning process, the learners' processing depth when they are learning as well as existing knowledge structure of learners.

Ally found that the trend has been tended to constructivism. When the learners can combine and integrate the knowledge into the actual context and apply the knowledge into the context at once with their own understanding, the learners learn the best. Downes (2006) and Siemens (2004) mention that connectivism theory is discussing by researchers. From Siemens point of view, connectivism theory integrate disorder, network, complicated and self-organizational theories into principles. Because of the present time is an era of information explosion, the learners cannot control what to learn. Siemen (2004) states that some information or knowledge is coded in machines and some information or knowledge exists in human beings.

Ally found that some thoughts and rules of behaviourist, cognitive and constructivism theories are apparently similar and imbricate after analysing those schools of thought deeply. Ally proposed that online learning materials can be designed

according to all those three schools of learning theories. Ertmer and Newby (1993) further explain that those three schools of learning theories can answer what, how and why questions.

According to Good and Brophy (1990), behaviourist believes that the mind can be regarded as a black box and can be watched quantificationally. Therefore, the influence of the thought processing in the mind can be ignored. And the behaviours can be watched and measured as one of learning indicators. Ally concludes four implications of the school of behaviourist theory for online learning.

Firstly, students in online learning class should be notified online learning outcomes clearly so that students could set learning expectations. Meanwhile, the online learning students could know and estimate whether they meet the requirements of online learning courses outcomes.

Secondly, tests should be organized for online learning students in order to test whether they meet the requirements of online learning courses outcomes. The tests could be implemented through online or other forms. Both the different forms of tests and assessment should be designed in online learning courses so that the instructors or teachers could know the online learning students' achievement and their learning level. And the instructors or teachers could offer the online learning students' appropriate feedback in time.

Thirdly, the online learning materials should be designed as sequence that could help the online learning students absorb the knowledge from unknow to know, simple to complex and knowledge to application.

Fourthly, the instructors or teachers of online learning courses should offer feedback in time to the online learning students so that they could supervise them how they are doing and correct online learning students if necessary.

Ally states that cognitive psychologist focus on learners using different types of memory to learning and how to process information. Ally agrees that when learners receive sensations through sense organs, the sensations can be stored before information processing.

Usually, the sensations information can be stored in sense organs for less than 1 second. If the information cannot be transferred into working memory at once, it will be lost. Online learning must apply approaches to help learners to focus on material so as to transfer senses to sensations stored for next step and to working memory for the last step. The transferred quantity of information stored in working memory lies in attention level of information inputting and whether learners' cognitive structures can understand and process that information. The working memory can last 20 seconds only.

Therefore, the online courses and online material designer should examine if there are proper existing cognitive structure so that the online learners can process the information smoothly. If there are not proper existing cognitive structure, the pre-instruction approach should be arranged in part of learning process.

The learning material and strategies of online learning should be presented so that the students could understand and process them effectively. Because of the limited capacity working memory, the online learning material should be designed as pieces

of proper size so that the information could be processed easily.

The school of cognitive psychology theory holds that the information exists as many dots stored in long term memory and those dots connects each other to form different relationships which is consist of networks. The networks form the information map. According to the relationships, the information map includes several main themes and those main themes should be included in online learning materials. The information map is a method that assists the learners make their cognitive structure become more concrete, at the same time the information map should possess critical reflection that urges the learners on forming their own information map in order to process the information deeply (Stoyanova & Kommers, 2002).

Ally concludes several influences that the cognitive psychology theory brings to online learning. Ally holds that the learning or teaching strategies should facilitate the learners to notice and perceive the information so order to transfer the information into working memory. The learners record the information as the form of sensation through their sensory organs systems.

According to Tan (2019), at present, there is a broad concept on learning mode. She believes that blended learning is a blended of online and face-to-face learning. Since late 1990s, blended learning has gradually entered the of vision of researchers both domestic and overseas. So far, the evolution and development of the concept has gone through three stages.

In early days, the Sloan Alliance of the United States very representatively proposed that blended learning is a blended of online and face-to-face learning mode.

It combines traditional face-to-face teaching and online learning the two different independent learning mode together. That means that the teaching content combines online and face-to-face learning. It includes different proportion between those two modes. Comparing with online learning only and face-to-face learning only, scholars claim that blended learning is a transitional mode. They hold that blended learning is based on information technology. It is a combination of online and face-to-face learning simply.

After 2007, the United States Sloan Consortium updated concept to further clarify the proportion of online and face-to-face learning in blended learning. It suggests that only 30% to 79% of the learning content used in online learning can be called blended learning. At this stage, scholars focus on the interaction. The interaction includes teachers and students, students and students, students and resources in online and face-to-face learning.

The Internet and information technology develop rapidly. The concept of blended learning has been further developed with the condition of internet integration. The concept of blended learning is enriched. Because the combination of learning based on mobile communication devices, network and classroom enviroment. At this stage, scholars changed their perspectives of research from technologies and teachers to students, emphasizing the creation of a kind of authentic and highly personalized learning and participation of learners. It is highlighting a blended of teaching and tutoring methods. It takes students as a central role.

According to above analysis, it can be found that blended learning concept during

the past more than 20 years experienced three stages during the evolution of this concept, which changes from the initial focusing on information technology to gradually focusing on the process of teachers and students growing together and improving the teaching effect. In the early stage, most researchers believed that online learning will take the place of replace face-to-face learning so that it can save learning costs and make learning more convenient. At that time, blended learning was considered a transition and blended learning was only used as an auxiliary means of online learning.

Up to present day, some researchers still hold the main function of blended learning is to solve problems of the effectiveness of large scale class learning and lack of learning space. The practice indicates that carrying out blended learning with substitution theory or auxiliary theory can only achieve the same learning effect as face-to-face learning, but cannot produce greater benefits. With the gradual deepening of blended learning research, the researchers put forward the idea of facilitation theory.

Blended learning can take the advantages of both online and face-to-face mode, promote the reform of learning and teaching mode, integrate the internet, mobile terminal and other information technologies into the establishment of learning activities and course content, create student-centered learning situation, so as to promote, enhance and improve classroom learning, enhance and improve the learning effect. The past practical research findings indicates that most of researches focus on learning effect. Comparing with online learning only and face-to-face mode only, they holds that blended learning achieve better learning effect (Tan, 2019).

Song (2020) states that blended mode has existed for over 20 years. From the view of information technology application, blended learning has central position in early days. Later, it emphasis on strategies and methods, it emphasizes on student experience and participation in the current internet plus era, the concept and blended learning features, blended learning purposes, designing and implementation of blended learning, evaluation criteria of blended learning and so on have changed through the changing of the times.

Foreign researchers mainly focus on the learning platform, information technology and mobile terminal, and they pay high attention to the effect of blended teaching (Tan, 2019). Domestic scholars prefer to study the blended resources, and the application research is mainly in higher education and vocational education (Tan, 2019).

As for the current research situation in western countries, the research on blended teaching in western countries, began in the late 1990s. In 2000, the concept of blended instruction was first proposed in the White Paper on Educational Technology in the United States. Since then, the researches on blended learning have been highly concerned.

According to Tan (2019), at present, foreign researched on blended teaching focus on the following topics which include online learning platform, social network, mobile device and mobile learning. There are abundant researches on blended learning theories abroad, such as interaction theory, connectionism, community, finishing theory and translational learning theory so on so forth. All these theories have obvious

characteristics of social constructivism, and are constantly evolving, developing and integrating in the research. Researchers have been paying attention to blended learning effect and blended learning models. According to a survey from U.S. Department of Education's Effective Learning, it shows that blended teaching accounts for 50% of British universities. More than 80 percent of the faculty in Singapore's colleges and universities conduct blended learning.

As for the researches on learning effect, more and more scholars point out that it is of little significance to measure and judge whether the effect of blended learning is better only based on the assessment data. It should turn to exploring how to maximize the effect of blended learning and analyzing the key influencing factors. Some researchers are committed to providing effective support for learning with technology, designing a teaching system that can accurately record the learning process and give timely feedback through recording, management, evaluation and other functions, so as to control the whole learning process and ultimately ensure achievement of learning effects.

In 2003, Professor Zhu Zhiting of East China Normal University first introduced the concept of Blended Learning in China in his book which is named Blended Learning in Distance Education. In the same year, Professor He Kekang put forward the idea of Blended learning at the 7th Global Chinese Conference on Computer Applications in Education. He actively advocated the introduction of blended teaching into curriculum teaching.

In 2004, Professor Li Kedong completed the report Blended Learning -- An

Effective Way to Integrate Information Technology and Curriculum, creatively put forward 8 steps of blended teaching and deeply discussed blended teaching. Subsequently, Professor Huang Ronghuai from Beijing Normal University put forward that blended learning is to deliver appropriate ability to appropriate learners at proper time, through proper learning technology application and proper learning style. Therefore, it can achieve the maximum optimize the learning effect of the learning style.

In addition to the above research topics, some scholars have discussed the problems such as the increase burden of students' learning and teachers' improvement as well as students' information literacy under blended teaching. It can be seen that the concept of student-centered has been gradually deepened how can I help students enhance the blended learning experience and solve blended learning confusion in learning is a positive motivator.

According to Song & Yao (2020), preparation for blended teaching is crucial beginning of blended learning. Blended learning is a systematic project, which must be fully prepared, including three main factors preparation of education and teaching authorities, teachers and students. The research and attempt of blended learning in European and American universities started earlier and became relatively mature. For example, the United States set up a fund to encourage blended learning development. Universities at all levels in China also set up special funds to support blended teaching.

In April 2013, it is also established the first MOOC alliance which is called Eastern and Western University Course Sharing Alliance in China. That Alliance

advocates the blended learning model featuring flipped classroom and face-to-face discussion. Blended learning effect largely depends on how teachers realize transformation from the traditional teaching of teacher first and student second to teacher leading and student as main body.

Most of teachers generally recognize the convenience and results of blended learning, but it will also seriously affect teachers' integration of this teaching reform due to technical problems, time and energy, students' cooperation and other factors. Scholars all over the world have studied the abilities and qualities that teachers should possess under the blended learning mode, put forward some views and constructed the framework of teachers' abilities, which mainly include having the consciousness and concept of teaching reform, having the ability of collaboration, reflection, continuous improvement, innovation and communication, having the ability of data thinking, and learning planning. It also includes teachers should have ability of applying teaching and learning tools. Some scholars believe that teachers should improve their critical thinking ability, information literacy and technology application ability, and put forward some ways and measures to improve.

There are few special researches on the present situation of teachers' blended teaching ability and how to make teachers have these teaching abilities, especially the research on blended teaching and learning method is scarce. Most studies on blended learning are carried out through means of questionnaires. Most of researches shows that most learners hold an open and positive attitude towards blended learning. But some learners still prefer pure face-to-face learning. Blended learning process is an

important step for blended learning. And the implementation of blended learning is based on learning design and learning strategy.

For learning styles proportion, blended learning mode consist of face-to-face oriented, online oriented as well as blended. According to the teaching method adopted, it can be divided into lecturing, autonomous and interactive. According to the application level, it can be divided into the blended of online and face-to-face, the blended of learning objectives, the blended of learning and learning, and the blended of learning and work. The lower level is the blended of online and face-to-face, which basically adopted in early blended learning.

On the research of blended teaching strategies, some scholars put forward their views from the perspectives of three stages and they are before, during and after class. They believe that meaningful learning activities should be designed before class to stimulate learners' enthusiasm, listen to the learners in class and communicate with them and answer questions, and design homework and exercises after class to consolidate and test what he has learned.

Some scholars put forward corresponding strategies from the aspects of preliminary preparation, teaching operation, teaching evaluation and so on. They believe that in the preliminary preparation stage, relevant teachers should receive professional training of blended teaching technology for high quality teaching. In the teaching operation stage, it should do a good job in four links, such as guidance, connection between online and offline learning, live courses and discussion. Teaching evaluation should form a multi-dimensional evaluation system. And it should be

evaluated from content, subject, and evaluation methods.

Josh Bersin (2002) believes the blended learning process mainly includes four basic links and they are earning needs identification, learning strategies, content selection, as well as follow up learning process and evaluate learning effects.

Firstly, learning needs identification refers that students' needs are diverse. Therefore, it is necessary to find their learning needs out in blended learning.

Secondly, develop learning strategies refers that characteristics of learners include many aspects, such as learning style (i.e. field dependence or field independence), original knowledge and skill structure, and intelligence level (IQ). Blended learning requires the formulation of adaptive learning strategies and determined measurement plan based on learners' features.

Thirdly, learning content selection is determined based on facility environment in which blended learning is implemented. Basic facilities usually refer to the facilities for realizing online learning, which are constructed by the units carrying out blended learning.

The following issues should be considered. The first is bandwidth. Some learners do not have remote high-bandwidth access. Therefore, some content will not run on their machines. The second is standard. Each computer may use a different operating system, a different browser version, and different plug-ins. Therefore, set content standards for browser version, plug-ins, bandwidth, memory, CPU speed required, and so on. The third is limitations of LMS which is learning management systems. Generally speaking, LMS system is expensive and cumbersome to use. As a result,

many companies tend to omit some of these features when buying. The fourth is time constraints. If a relatively large project is completed in short time, it must be sufficiently efficient. The fifth is metrics. Without clear metrics during learning process, it is not easy to measure learning effectiveness. Most current LMS still lack flexibility in terms of non-custom reporting systems.

Fourthly, the last basic link is executing a plan to follow up learning process and evaluate learning outcomes.

Barnum and Parrmann (2002) proposed a model of blended learning, which consists of four stages. The first stage is web-based transport. Put the learning material on the web, and learners can browse the material on the web page. The page includes experts contact, so learners can always contact the experts if they have a question or if they want to explore further. This way is great for learning and promotes independence and self-confidence. The second stage is face-to-face processing. The Web is important, but communication between human beings is still very necessary. Face-to-face learning process is not just about sitting somewhere and listening to someone speak, it should be a knowledge building process. The third stage is to form a certain product. It is not enough to build knowledge, but to create tangible products in the process of sharing that knowledge. There are usually three paths.

First of all, after the face-to-face period under the guidance of teachers, students should record their learning experience, homework, exercises and so on, and communicate the draft with teachers, mentors and study partners through E-mail, which will help learners to fully think about the problems to be solved.

Second, publish the writing outline for the group members and teachers to watch and give feedback to each other (such as making comments, etc.).

Finally, complete the final version of the assignment and post it on the web page and send it to teachers and students. The last stage is collaborative extended learning. Students are arranged in small groups, usually two or three in each group. These groups meet once a month for one to two hours to share their experiences, reflections and insights. The rest of the time, group members stay in touch through email and online learning communities (Li, 2004).

7.1.1 Enhancing digital-education

Education and learning theories impact deeply on online learning and make great contribute to online learning. Online learning materials designing benefit from those theories and those theories will continue to be applied in online learning materials development. Behaviorist theory could be used for teaching what the fact is. Cognitivist theory tells how the principles and progress are. Constructivist theory teaches the learners to apply knowledge in real life and individual application as well as contextual of situation learning.

When it shifts to constructive learning, the learners have chances to send information through online learning courses constructing their own meaning. Base on the current learning theories, connectivism theory guides online learning theories. Because those theories that mentioned above are established earlier than our present network world. Globalization influence learning content and learning styles of the

students and enhance the flexibility of the learners.

Besides that, it also brings influence that using online learning materials repeatedly which can satisfy the demands of different learners all over the world. The online learning materials will be divided into continuous different segments. Those different continuous segments can satisfy different demands of learners and different context situation.

According to Chittaro & Ranon (2007), the educators are allowed to design lifelike teaching and learning environment through 3D interactive graphics and internet technology for enhancing learning efficiency.

The year of 2020 is an extraordinary year. The way of people living and working have changed tremendously. “Clouds” have come to us from the sky. Cloud class, cloud office, cloud shopping, today “everything can be cloud”, and cloud is becoming a carrier of this era, but also a sign of digital development. In a complex and uncertain era, digitalization has fully arrived, and digitalization is the greatest certainty of the future. Looking back at the major changes in our way of life, from the epidemic to the resumption of work and production, to the comprehensive digitalization of new scenes and new businesses, the biggest keyword is digitalization of the whole society.

In 2020, the COVID-19 pandemic has accelerated this change. Teachers who used to be more conservative began to learn to live stream, learn to take screenshots, learn to wake up students sleeping on the other side of the screen, and this is one of the scenes we see today. Cloud class, cloud office, and even cloud medical treatment, one of its biggest characteristics is the scene of digital integration, no matter it is education,

work or medical treatment, including tourism, there may be a specific combination of digital integration (Tang, 2021).

The pandemic presents a transformational opportunity for education. This is the world's largest digital teaching social experiment and a practice of open education resources. It is clear that facing the pandemic, the education industry has a transformational opportunity. The epidemic has made universities more digitalized. An online education App can solve all the problems that can quickly liberate teachers from routine work and make them more focused on teaching itself (Tang, 2021).

Undoubtedly, Tang (2021) points that the epidemic has brought huge flow dividends to digital education, but also brought more thinking for the transformation and upgrading of the industry. Tang (2021) indicates that digital education is indeed a brand-new form of education, but it not only brings new technology to the education industry, more importantly, it brings new thinking, new mode, new concept, and promotes the reform of education organization, service innovation, model upgrading, from traditional education to modern education.

The application of digital education is mainly realized through participants, including teachers, students, management people, administrators, etc., who will apply Internet education in teaching, learning and daily working. Participants will take "cloud" as the source and resources generated in their teaching, learning and management activities forming a complete closed-loop system to promote the development of education through cloud platform (Tang, 2021).

Obviously, there are significant differences between the digital education system

and the inherent face-to-face education system. The teaching preparation will shift from course preparation to course learning design, the teaching process will shift from knowledge teaching to organizing learning activities, and the teaching evaluation will shift from semester examination to focusing on the whole learning process (Tang, 2021). The data analysis results of this study also prove this point. In the digital age, the traditional way of information transmission, teaching methods and the way of acquiring learning resources, have all changed under the driving effect of technological development. In traditional education times, learners adopt passive learning mode and their role is limited to content consumers. Nowadays, with the emergence of new media, learners begin to change from passive to active, and can independently produce content while consuming content.

More than that, more and more people tend to choose personalized learning. Using advanced digital technology means to reform traditional teaching mode, enrich learning content and learning methods, broaden learners' choice space and provide them with necessary help (Tang, 2021). One of the goals of digital education is to create an intelligent learning space. Digitization and online is only the first step, while intellectualization and Intelligence are the future. Digital and intelligence are also compressed and parallel development, which together is "Digintelligence".

7.1.2 Limitation

There are still some shortcomings in this study. Firstly, due to the limitation of the urgency of time and be in order to get samples easily, I only selected 15 students

from one Hong Kong university as the research object. Therefore, it may lead to limited generalization of the research results and cannot be extended to a wide range of people, resulting in certain deviations in the research findings.

Secondly, during the interview process, some students had insufficient understanding of some questions, resulting in a certain number of invalid data.

In addition, due to my limited ability, only interviews were conducted with the target group, the research method is lack of diversity, and data was not collected from multiple dimensions.

7.1.3 Future Research

Firstly, more samples will be obtained from more universities in future research, making the samples and research results more extensive and generalizable. Secondly, using diverse research methods combined with big data technology, learning analysis, biometric technology, etc., through capturing the trace data of learners in the online learning process, analyze the data more scientifically and meticulously. Last but not least, some pre-testing of the target group should be done as much as possible to refine the interview questions so that the interviewees can understand the questions better.

7.2 Policy Implication

7.2.1 Policy Implications for Lingnan University

Lingnan University provides a very comprehensive policies on online teaching and learning during COVID-19. For example, Lingnan University introduced online

teaching and learning arrangement on 17 Mar 2020 when COVID-19 started. And in that policy, Lingnan University adopted online teaching and learning and integrate small parts of face-to-face when the situation permitted. And the policies provided updates and adjustments according to the situation changing. Lingnan University launched Teaching and Learning Centre and this Centre introduced Teaching and Learning Initiatives in 2017, set up the TLC eNews area of adopting Blended Teaching and Learning and actively promote information and communication technologies (ICTs) to implement and enhance online teaching and learning and help teachers have a deep understanding of online teaching and learning.

As for Teaching and Learning Initiatives, Lingnan University introduced The Online Course Teaching and Learning Enhancement System in 2017 for teachers' development. The system collects students' needs and suggestions for the center providing support for the students. As for the TLC eNews area of adopting Blended Teaching and Learning and information and communication technologies (ICTs), the Teaching and Learning Centre provides rich and comprehensive online learning materials and software to enhance online teaching and learning, such as Moodle, Zoom, Chatgpt, etc., This study recommends five aspects of policy implications with specific measures for each aspect for Lingnan University.

The five aspects of policy implications for Lingnan University and their relationship are shown as the following FIGURE 9.

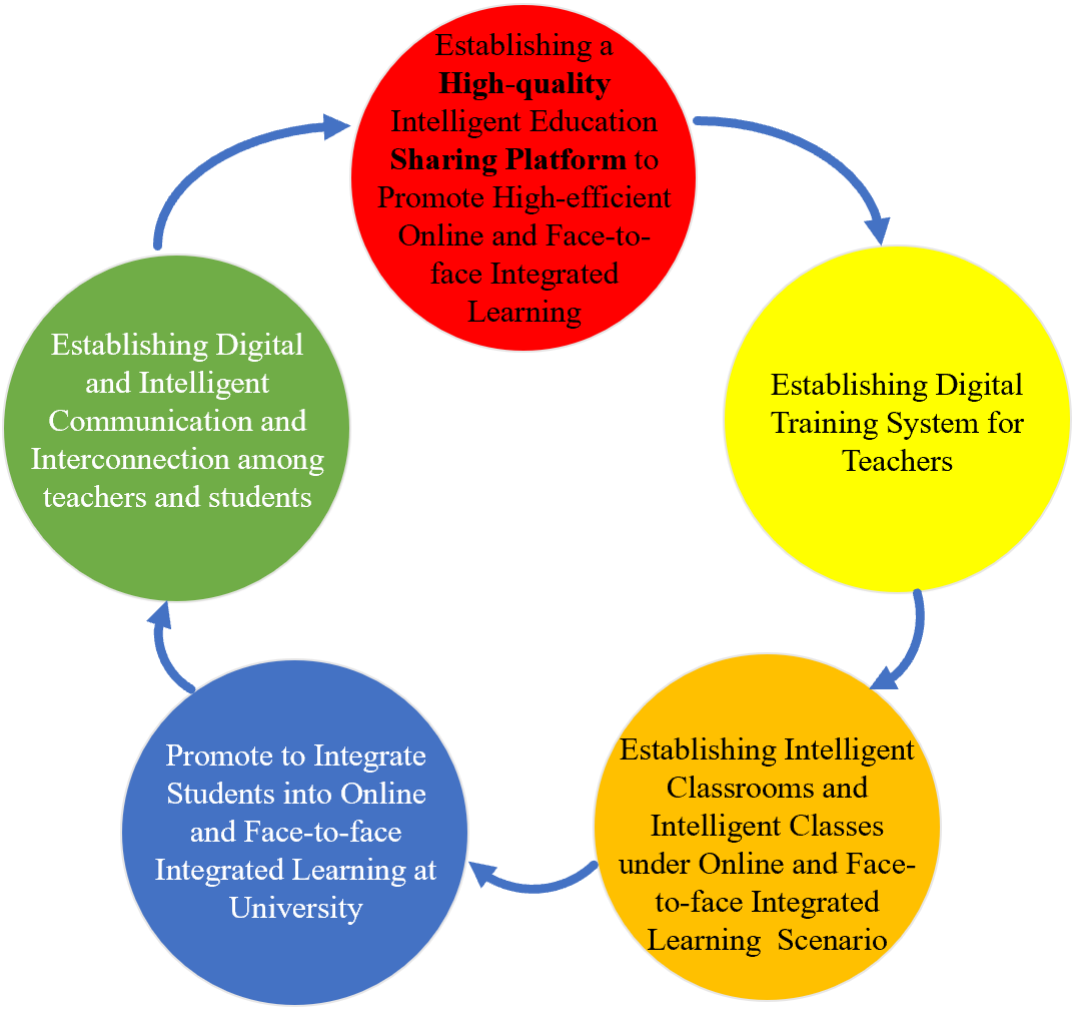

FIGURE 9. Five aspects of policy implications for Lingnan University

Firstly, according to this research, Lingnan University students strongly suggest that teachers should apply advanced digital technology in teaching. Then proposing requirements standards of digitalized talents team among teachers in Lingnan University.

In order to meet students' demands for digital education, Lingnan University could build a digital training system for teachers, apply the driven idea, promote the extensive applying big data, artificial intelligence and cloud computing. Moreover, Lingnan University also could promote deep application of new technologies in

teaching.

Lingnan University could implement teachers training plan, set systematic training standards on digitalization for teachers, propose features on digitalized talents training. Furthermore, Lingnan University also could put forth training mode for cultivating digitalized teachers, establish training platform and put training practice continuously as well as evaluate training results scientifically.

At the same time, improve teacher' digital literacy, help teachers master and use information technology to improve teaching, and develop and gather high-quality teachers' digital learning resources through multiple channels, so that more teachers can share high-quality education, teaching and academic research resources by means of information. Teachers' personal learning space should be established to form personal learning files. Teachers can choose resources to learn independently in the block, and record their learning situation at the same time, so as to strengthen teachers' learning behaviors analysis and enhance intelligent resource information delivering accuracy. Meanwhile, it also can satisfy teachers' personalized demands of development It can provide rich tool support for online and offline teaching and research activities to make teaching and research more efficient and share good lessons and teaching experience of excellent teachers.

Lingnan University students suggest face-to-face could be main teaching method, while online learning could be as a supplement. At the same time, students strongly suggest that teachers apply advanced digital technology in class. I think it is more suitable to call blended mode learning as integrated learning under the background of

current era and combined with the suggestions of students on learning styles in this research.

Secondly, therefore, it is suggested that Lingnan University could build intelligent classrooms and intelligent classes that integrate online and face-to-face mode learning. For integrated online and face-to-face learning scenario, the first step is to design a remote interactive teaching solution, which mainly provides one main lecture classroom plus multiple lecture classrooms with integration of two-way real-time interaction, teacher training and teaching as well as research. The key technologies include video conference function, cloud recording and broadcasting, interactive teaching software and other technologies, and electronic interconnection blackboard to achieve multimedia interactive teaching and improve classroom interactive experience.

Thirdly, promote to integrate students into online and face-to-face integrated learning at Lingnan University. In integrated online and face-to-face learning scenario, build and promote intelligent classroom and intelligent class within the whole Lingnan University. Intelligent classrooms and intelligent classes apply new technologies such as artificial intelligence, big data and cloud computing to form a new teaching space, with remote interaction, voice recognition, live recording and broadcasting, VR/AR, high-definition LCD splicing screen display and other functions. Artificial intelligence technology could be used for voice and image data processing of educational scenes, and content and service distribution are carried out on the Cloud. In remote class, artificial intelligence technology can automatically carry out voice recognition, real-

time translation, subtitle presentation, PPT recognition, and classroom interaction, which expands the scope of classroom learning, effectively collects learning data, data of teachers and students, and makes evaluation.

Fourthly, establishing digital and intelligent communication and interconnection among teachers and students at Lingnan University. Lingnan University could provide individualized information service for teachers and students through data integration, opening and sharing. Lingnan University, teachers and students can customize university management system, set up class group, class address book, teaching schedule, etc., which greatly facilitates the management and communication among teachers and students. Communication and information transmission within different campuses of Lingnan University becomes faster and closer.

Establish Lingnan University life instant communication system to satisfy the demands of teachers' and students' instant communication. Through Cloud system, Lingnan University can send notification, to do list, reminders and other information to achieve a user-oriented unified message service. Large scale meetings and trainings at Lingnan University can be streamed live, helping teachers avoid having to travel between several campuses. Digital and intelligent communication interconnection can also enhance the connection between Lingnan University and alumni. When Lingnan University has opening or graduation ceremony, alumni and all families can watch it simultaneously through live broadcasting without leaving their homes. Alumni can join Lingnan University's Cloud system to learn the latest news of Lingnan University and strengthen the connection with the alma mater.

Last but not least, establishing a high-quality intelligent education sharing platform to promote efficient integrated mode learning at Lingnan University. It makes full use of strengths of research of Lingnan University and emphasizes that students learn and think with technology as a tool, thus effectively enriching educational experience.

Teachers, Lingnan University and students can complete different work according to their own access permission, can use a lot of teaching software online, and can also obtain massive teaching resources according to their own needs through intelligent education platform. Lingnan University students can participate in intelligent classes, explore independently, interact with classmates and teachers, and carry out collaborative learning.

The platform also provides Lingnan University students with an autonomous learning system that can study anytime and anywhere, greatly improving the learning quality of students, creating a new learning space for Lingnan University students and breaking the constraints of traditional classroom teaching. Through the platform, communicate and interaction happens among teachers and students at any time to solve difficult problems. The development goal of that platform is to make all Lingnan University students who enter the platform enjoy a relaxed and pleasant learning experience. Lingnan University teachers could apply teaching diagnosis in developing personalized teaching plans and programs, implementing discussions on teaching, and sharing academic research findings and achievements.

7.2.2 Policy Implications for Higher Education in the City of Hong Kong

Mok, Xiong and Rahman (2021) believed that the COVID-19 pandemic changed the education scenery globally. They talked about the new phenomenon of emergency online learning which caused confusions so that it is necessary to study the quality of online learning which is concerned by both teachers and students.

Their paper tried to discuss whether online learning can cultivate and improve students' competence so that they can be competitive in talents market. The authors also talked about how long will the students take to adapt themselves to the scenery changing of high education, society and their personal life.

This article also explored two questions on how do Hong Kong higher education students evaluate their online learning experience and what factors influence Hong Kong higher education students online learning experience. They collected data from 1,227 higher education institutions through online survey. The results showed that most of students were dissatisfied with online learning. The paper would like to argue how does online learning help higher education students equip required competence and new skills to be competitive in talent market and to contribute to society. The study results are valuable in providing empirical data as reference for education policy maker in order to benefit pedagogy design and effective online teaching and learning implementation.

COVID-19 and technology development further promote and accelerate higher education to be digitalized. Digitalized higher education is an important engine to promote the modernization of higher education in the digital era and a strong support

for new advantages. Speeding up the construction of digitalized higher education has great significance and far-reaching influence on higher education modernization.

Higher education in Hong Kong can accelerate the construction of a new development pattern, strive to promote the high-quality development of higher education in Hong Kong, strengthen the concept of systems, comprehensively improve the integrity, system and synergy of digitalized higher education, promote deep integration of digitalized higher education and offline education, and drive the transformation of teaching and management methods with digitalization.

Therefore, I recommend four aspects with specific measures of policy implications for higher education in the city of Hong Kong. First, strengthen digital infrastructure and data resource system. Second, promote the deep integration of digital technology into curriculum, teaching, management, teachers and students, and academic research. Third, strengthen the capacity of digital technology innovation system and digital security barrier. Fourth, optimizing digital development environment.

The four aspects of policy implications for higher education in the city of Hong Kong are shown as the following FIGURE 10.

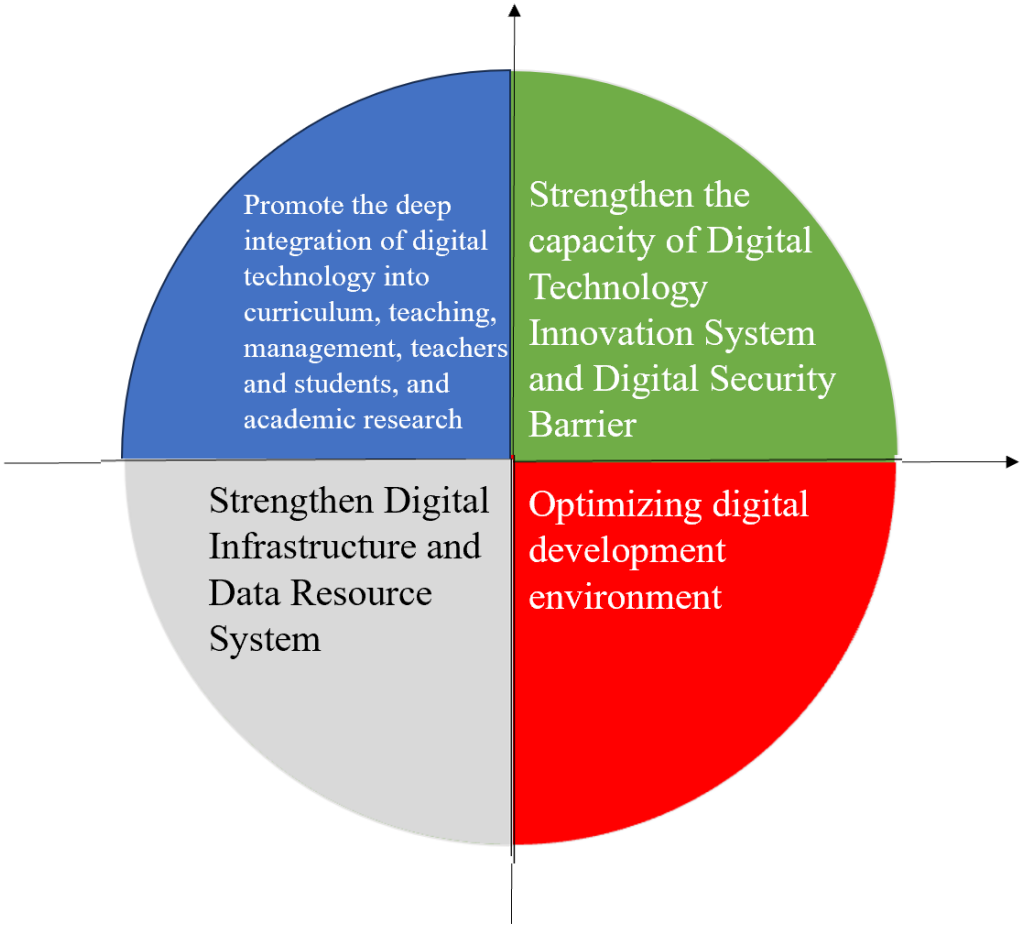

FIGURE 10. Four aspects of policy implications for higher education in the city of Hong Kong

First, strengthen digital infrastructure and data resource system. Higher education in Hong Kong could accelerate the application of 5G network and promote the comprehensive development of mobile Internet of Things. Hong Kong higher education could systematically optimize the layout of computing infrastructure, and guide the rational layout of general data centers, supercomputing centers, and intelligent computing centers. Hong Kong higher education could improve the application level of infrastructure, and strengthen the digitalization and intellectualization of traditional infrastructure. In addition, Hong Kong higher

education could guarantee the circulation of data resources operating smoothly circulation, establish higher education data management system and mechanism in Hong Kong, promote the convergence and utilization of public data, and build a Hong Kong higher education database.

Second, promote the deep integration of digital technology into curriculum, teaching, management, teachers and students, and academic research. Higher education in Hong Kong could promote the deep integration of digital technology and offline education, accelerate the innovative application of digital technology, and develop efficient and collaborative digital management. At the same time, speed up the innovation of institutional rules and improve the rules and regulations that are compatible with the construction of digital government affairs. Strengthen digital capacity building, and promote information system network connectivity, data sharing on demand, and efficient business coordination. Improve the level of digital services and create a future-oriented intelligent immersive educational experience.

Third, strengthen the capacity of digital technology innovation system and digital security barrier. Hong Kong higher education can strengthen the enterprise-led deep integration of industry, university and research. At the same time, build a credible and controllable digital security barrier. In addition, Hong Kong higher education should effectively maintain network security, establish a basic system of data classification and hierarchical protection, and improve the network data monitoring and early warning and emergency response system.

Fourth, optimizing digital development environment. Higher education in Hong

Kong could compile operating instructions of digital standards, speed up the formulation of standards for the application of digital transformation in higher education in Hong Kong, and promote the construction of network civilization. At the same time, Hong Kong higher education could build a win-win international cooperation pattern in the digital field. Hong Kong higher education could make plans for international cooperation and build new high-quality cooperation platforms in digital field.

7.3 Conclusion

Students enjoy flexibility and convenience of online learning, but online learning cannot replace face-to-face learning and students prefer to the integration mode of online and face-to-face learning. The integration mode of online and face-to-face learning application can not only provide students' personalized learning resources via online platform, but also contribute to students' learning efficiency during the teaching process of higher education.

The teachers can utilize online platform to arrange homework for students, guide and organize students to actively use online learning resources, as well as preview lessons, online class activities and quiz so as to adjust the teaching plan and teaching arrangement in time according to the students' performance, and effectively improve teaching efficiency. And the teachers can make use of face-to-face teaching mode to carry out face-to-face communication and interaction with students and examine students' pre-class preparation, focus on explaining the key points and difficulties of

the course, and implement relevant practical activities according to the specific needs of the course and teaching content, so as to help students closely combine theoretical knowledge with practical operation, so that students have deep understanding of the class content.

Students have high needs on interaction and communication in online learning. Teachers should design different activities for the learners. After those activities, the teachers should involve the learners into different kind of interactions. The learners are guided to get course materials through interface. The interface should be designed to be easy to interact. It should help the learners be easy to sense the information in order to transfer the information into sensory organs and then be processed in short memory. The learners should interact with the content. They should acquire the knowledge that they need and rich their own knowledge storage. Interaction among the learners is very important. The interaction includes learners with other learners, learners with instructors or teachers, learners with experts and they cooperate with each other, share their cognition, form community network and construct social existence. The learners should be able to interact with each other in their context of situation and construct their own meaning with personalized information. The learners should be provided opportunities for applying what they learner in the practical situations. Therefore, they could have better ideas and make faster progress.

Online learning is a kind of interactive learning mode which contribute to the learners' knowledge constructing. Because in online learning class, the students must learn actively and interact with other students and teachers. Besides that, the students

control the online learning class. In internet environment, the students can experience the information directly but rather than accept the flittered information for their different styles of teachers or instructors. In traditional class, the teachers or instructors design the classes or courses be contextualized and personalized which meet their own needs but that may be not suitable to every learner. In online learning class, the learners experience the information in person directly which make the learners have chances place themselves in contextual situation and personalized the information.

The large-scale outbreak of COVID-19 in 2020 forced some teaching activities to shift from offline to online, in which technology played an irreplaceable positive role, but it also exposed some problems in current digital education. Digitalized and intellectualized education will be further explored and its value creation ability will be significantly improved. Teaching can be displayed in multimedia way and it is convenient to be access to relevant knowledge.

It can be concluded through this research that traditional face-to-face education has very low requirements on technical operation of teachers, while digital education needs new technologies support. Completing teaching task, teachers must have new technology operation ability that required by new technologies and teacher have to become lifelong learners.

Hence, the knowledge reserve of teachers must be sufficient, and learning at any time and lifelong learning becomes a necessary condition for teachers. The working content of teachers is more about designing learning process than just delivering learning content. In digital education, learning ability is more attractive and important

than learning results. Interaction in digitalized teaching is more difficult than that in face-to-face classroom. Meanwhile, the requirement for learners has changed from being able to answer questions to learn to find and discover problems.

Hence, it is important arouse students' learning enthusiasm to participate in interaction. Digitalization and intellectualization of campus, classroom and teaching solutions will promote the modernization of education to develop further and university policy making also have to be prepared for that accordingly.

Appendix

1. ETHICAL REVIEW

Attachment (ii) to
Appendix E

LINGNAN UNIVERSITY

Application for Ethical Review of a
Research Project Involving Human Participants
by a Taught Postgraduate Student

Section A: to be completed by the student

I. Title of Research Project

Students' Attitudes on Online and Face-to-face Learning During COVID19 : A Qualitative Study

II. Details of Procedures to be Used in the Research

Community of Inquiry (COI) will be applied in this research. This research also will apply Focus Group Discussion Questions based on Community of Inquiry (COI)Framework and will use thematic analysis based on Community of (COI) Inquiry Coding Template to process the data.

III. Participant(s) Involved in the Research

[Approximate number, age group, how obtained, and information on whether the researcher is in a position of power vis-à-vis the participants e.g. teacher-student, employer-employee.]

The research will be designed starting by sending participants invitations to Lingnan University students and 12 Lingnan University students will be selected by random. The researcher is not in a position of power vis-à-vis the participants.

IV. Do your procedures expose your participants to any risk of:

[Please check in box(es) as appropriate]

Yes	No	
☐	☑	- danger or physical harm
☐	☑	- pain
☐	☑	- stress
☐	☑	- fatigue or other form of physical discomfort
☐	☑	- noxious stimulation
☐	☑	- emotional distress or other form of psychological discomfort
☐	☑	- invasion of privacy
☐	☑	- deception
☐	☑	- criminal or civil liability

If you have checked "Yes" to any of the above questions:

1

(a) Estimate the degree of risk involved
(b) Describe the steps you will take to minimize the risk and to protect your participants from it
(c) How will you explain the risk to your participants?
(d) How will you obtain their consent to take part in the research (please attach consent forms to be used)?
(e) Will there be any payment to the participants?
(f) Describe how the participants will be debriefed after the study

V. Will you collect names, addresses, or any other details which would make it possible to identify your participants?

☑ Yes ☐ No

If you have checked "Yes" to the previous question:

(a) Describe the identifying data you will collect

I will collect the participants' names, age, gender, education background information into a form.

(b) How will you use these data?

All the names, age, gender, education background information of participants in this research will be confidential and anonymous.

(c) How will you dispose of these data?

All the data of the names, age, gender, education background information of participants in this research will be disposed on Jun 1,2025.

(d) What procedures will you follow to make sure that your participants cannot be identified?

All the names, age, gender, education background information of participants in this research will be anonymous and confidential.

VI. Declaration

I undertake to exercise reasonable care to ensure that the proposed research is conducted in a manner that is consistent with international standards of ethical practice.

刘岩颖 — Signature of Student

Feb. 9, 2022 — Date

LIU Yanying	Doctor of Policy Studies
Name of Student	Study Programme

Personal Information Collection Statement:

1. Personal data provided on this form/report will be treated confidentially and will be used for processing this application/matter only.
2. Information provided may be transferred to other units within the University for necessary actions, where applicable, and will not be disclosed to other parties without your consent or unless required by law.
3. Without your consent, the University will not use your personal information provided to us to conduct direct marketing.
4. Applications for access to personal data should be made to the Data Protection Officer (DPO@LN.edu.hk) of the University. For update/correction of personal data, please contact the relevant Programme Offices as shown at https://www.ln.edu.hk/sgs/taught-postgraduate-programmes/programme-teams-contact.

Section B: to be completed by the (Chief) Supervisor of Taught Postgraduate Student in consultation with the Co-Supervisor(s), if any

Having considered the information provided above, I :

☑ approve this application.

☐ do not approve this application.

☐ wish to refer this application to the Programme and Curriculum Committee (PCC) concerned and, if necessary, further to the Research Ethics Sub-Committee for consideration.

Yidan Zhu — Signature of Course Instructor

Feb. 9. 2022 — Date

YIDAN ZHU — Name of Course Instructor

(Note: Upon the student's request, the University shall provide a copy of the information given on this form to the student in compliance with the Personal Data (Privacy) Ordinance when all necessary processing of this form is completed.)

Ver. Sep 2020

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