A Study on Online Readiness for Learning for Applied Undergraduate Students Based on Rooting Theory

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Abstract: It has been three years since the outbreak of the Covid-19, and until the epidemic is completely over, online learning will continue, based on a full understanding of the advantages of online classes, and how to readiness for online learning in order to better meet the learning needs of students and thus further improve the efficiency of online classes. In this context, it is of great importance to conduct an in-depth analysis of students' readiness for online learning. Using structured interviews, 10 students from an applied undergraduate school across the region were interviewed to explore the factors that influence students' readiness for online learning: 1) The differences in online learning readiness among students of different genders are greater. 2) The availability of technology and hardware facilities is the main factor in the readiness required for online learning. 3) Emergencies affect online learning readiness to some extent. 4) The impact of vision and students' perceptions are external factors that affect readiness for learning, and learning confidence and motivation are internal factors that affect readiness for learning. Accordingly, the following suggestions are made for the online learning readiness of university students: using gender differences to improve online learning readiness, improving the proficiency of teachers and students in using equipment (technology), improving the ability to deal with online learning emergencies, and clarifying learning motivation and correcting learning attitudes.

1. Introduction

The development of Internet technology has brought profound changes to people's lives and work. With the outbreak of the Covid-19, online classes have gradually stepped into the education vision and played a very important role, such as online classes through Tencent Meetings, Nails and Tencent Classroom. As of 2022, the Covid-19 is not over and online classes are still with everyone. It is undeniable that online e-learning platforms have broken the restrictions of time and place, making it possible to learn classroom knowledge anytime and anywhere, and also providing new development ideas for the reform of online learning. However, the effect of online learning is not so optimistic, as more or less students suffer from network lag in classes, practice-based courses cannot be conducted online, and backward remote areas are even less well connected to online classes due to insufficient Internet facilities and weak signals, making them unable to connect to online classes thus creating concerns about learning progress, confidence and academic

performance [1].

It has been three years since the outbreak of the Covid-19 and online learning will continue until the epidemic is completely over. Therefore, based on a full understanding of the advantages of online classes, it is important to understand how to readiness for online learning in order to better meet the learning needs of students and thus further improve the administrative efficiency of online classes. In this context, it is of great importance to conduct an in-depth analysis of students' online learning readiness and learning status, and to understand the factors affecting the learning efficiency of online classes[2].

2. Information and Methods

2.1 Data collection

2.1.1 Interviewees

Up to now, all university students in all universities in Guangdong Province have experienced online learning, and one of the applied undergraduate students in Guangdong Province was selected for interviews. In the process of selecting the interviewees, 10 interviewees were finally selected, with reference to the gender distribution of the users, 5 of each gender, involving different 10 majors.

2.1.2 Interview format

Structured interviews were conducted through on-site interviews, WeChat, QQ and other forms. In order to guarantee the quality of the interviews, participation in the interviews was conducted with the consent of each interviewer. Based on the principle of confidentiality, the interviewees were made anonymous, as shown in Table 1, and were differentiated by means of numbering.

Table 1: Basic information about the interviewed users

Number	Gender	Major	Age	Education background
S1	Female	Accounting	18	Undergraduate
S2	Female	Financial Management	17	Undergraduate
S3	Male	Marketing	18	Undergraduate
S4	Male	Business Administration	19	Undergraduate
S5	Male	Computer Application Technology	18	Undergraduate
S6	Female	Early Childhood Education	18	Undergraduate
S7	Female	Software Engineering	18	Undergraduate
S8	Male	Logistics Management	18	Undergraduate
S9	Male	Software Engineering	17	Undergraduate
S10	Female	Web and New Media	18	Undergraduate

2.2 Root Theory Analysis Method

This study used rooting theory to qualitatively analyse the data through 3 steps: open coding, spindle coding and selective coding, and to ensure research validity through theoretical saturation tests. This study did two separate coding of the interviews, without affecting each other. Firstly, the transcripts of the interviews were studied and analysed separately without affecting each other, and sentences closely related to the content of the study were selected for conceptualisation, and the concepts were categorised and further categorised. Finally, the respective codes were cross-referenced one by one to identify the two separate codes, the same and different coded content,

adopt the same coded content and compare the different codes, reading them in depth for reflection. The comparison was done on the basis of a large number of papers, and in the process concepts that appeared less than once and could not be categoryised were eliminated.

3. Results

3.1 Open coding, extraction of concepts and categories

Table 2: Results of open coding

Content of the interview	Open coding to extract the category	Frequency
Boys using electronic devices in class sometimes can't help but look at other things, and sometimes they hang around to play games and brush up on their TV shows, thus affecting the efficiency of the class	Class efficiency	3
The more important factor of satisfaction should be the fluency of equipment use and the enrichment of network teaching	Fluency of equipment	2
I don't think there is a big difference, but the focus is different, with girls being more interested in communicating and answering questions, and boys being more interested in writing and answering questions	Focus	6
The girls usually use more mobile apps, but when it comes to more specialised apps they are a bit clueless	Software operation	4
Girls tend to have more problems when using electronic devices as they have little knowledge of the subject	Equipment knowledge area	4
Online teaching can be achieved by computer and mobile phone, and computer disconnection can be picked up by mobile phone traffic without too much impact on usage	Software equipment	9
Mobile phones and computers are already available and the network is generally good, but occasionally there are lagging situations that can affect the quality of the lesson	Network environment	8
Teachers are not familiar with the software	Teacher operation	2
Teachers may not be familiar with how to operate it, and only after half of the lesson did he realise that there was another class that had not entered the room	Operational familiarity	2
The microphone doesn't work properly when the class is suddenly named, so I can't express myself orally, and I can't answer questions in time	Equipment problem	3
Poor network speed directly dropped, stuck out of the classroom; some students accidentally open the microphone to affect the teaching progress	Network delay	6
I usually choose to take the exam in a place with a good network, and I pay more attention to important occasions like exams, so I don't just take the exam in a place with an unstable network, which affects the exam results	Academic performance	5
If you slip out of an online exam, you will be defined as having cheated and lose your exam results, leading to more trouble for students and teachers	Online examination	4
If the teacher's speech lags during the lesson due to network problems, this will result in us not being able to hear the teacher's lecture and thus worrying whether we will miss any important knowledge in the lesson and fearing that we will not be able to score well in future exams	Learning efficiency	4
Inadequate electronic equipment can cause problems such as network lag and lack of signal, which can lead to stress or affect the mood of online teaching, thus affecting confidence	Learning confidence	7
Preparing for this will make me spend more time outside of class to familiarise myself with the computer and observe how it is being used, thus making the computer and online lessons more effective. Learning how to use	Computer confidence	6

the computer in addition to the online lessons will help me to kill two birds with one stone		
I have also learnt to use the computer in a way that is beneficial to me, such as if my computer's network lags, which can directly interfere with my progress in online classes, or if a key point needs to be carried forward and backward, which can lead to a complete loss of knowledge, or if electronic resources such as examples or management plans are missing, which can prevent me from solving management or completing tasks in a timely manner	Course progress	5
The biggest motivation for learning is future career and development issues	Employment development	3
My motivation for learning is to complete my coursework and increase my knowledge. Motivation affects readiness for learning, in the sense that if you are motivated, you will take the initiative and do your coursework in advance, whereas if you are not motivated, you will not be well readiness for your course and may even lie flat	Professional ability	5
Will not. This is because the attitude to learning is something that is conscious of itself and not easily influenced by the outside world. Moreover, the internet is not well developed and it only affects our learning tools and our learning methods	Personal cognition	3
A poor internet connection can affect my attitude to learning by changing my mood, and can also affect my interest in learning by making me feel sad or confused because I can't access knowledge properly	Learning interest	6
Without a definite goal for the future, there will be no meaningful learning career, which will lead to a low level of interest in learning, which in turn will lead to aversion to learning and will greatly affect readiness for learning	Learning readiness	8

Open coding refers to the process of decomposing, comparing, conceptualising and categorising the collected data at the beginning of the study, that is, an operationalisation process of breaking up a large amount of data according to certain principles, assigning concepts to them and then reassembling them in a new way (Chen Xiangming 2000)[3]. The aim is to identify identical or similar types from the primary sources collected, and at the same time to name the types in order to define the concept and dimensions of the types. Open coding involves three steps: (1) conceptualisation, extracting the content from the original comments, breaking them up into independent sentences and extracting coding elements from these sentences, which in turn undergoes the transformation from generalised language to refined language to form initial concepts; (2) concept classification, optimising, analysing and filtering concepts, bringing together concepts of the same genus, analysing the links between words and forming a conceptual cluster belonging to the same (3) categoryisation, where the concept clusters are further abstracted and named. We used the free coding function of Nvivo 11.0 to code and label the collected interview data word by word without any researcher's preconceptions or biases, generating initial concepts and discovering conceptual categories from the primary sources. The results of the open coding are shown in Table 2. High frequency terms included: software devices, network environment, learning confidence, readiness to learn, interest in learning, network latency, and confidence in computer use.

3.2 Axial coding

An open-ended, line-by-line, sentence-by-sentence coding of the text, a process that allows for the identification and development of concepts and their characteristics and dimensions. The steps involved naming and categorising similar events and situations to form categories, resulting in a list of coding codes and categories [4] (Table 3).

Table 3: List of coding codes and categories

Principal category	Corresponding category	Specific connotation
Satisfaction degree	Environmental disturbance	Male and female students' satisfaction with using electronic devices
	Teaching enrichment degree	
	Class efficiency	
	Fluency of equipment	
Gender difference	Software operation	Gender differences in electronic device use between boys and girls
	Equipment requirements	
	Equipment knowledge area	
	Frequency of use	
Personal readiness	Software equipment	Personal readiness for online teaching
	Network environment	
	Learning readiness	
Technical readiness	Teacher operation	Online teaching technology readiness
	Network software	
	Data missing	
Teacher problem	Operational familiarity	Online course teacher emergency
	Teacher emergency	
Classroom problem	Equipment problem	Online class emergency
	Emergency	
	Network delay	
	Noise problem	
Influence aspect	Course learning	Online examination has been affected by unexpected events
	Academic performance	
	Online examination	
Personal influence	Visual influence	Online examination has been affected by unexpected events
	Student perception	
	Learning efficiency	
	Learning confidence	
	Attention	
Other effects	Computer confidence	Online testing has had other effects of the emergency
	Course progress	
	Omission of knowledge points	
Learning motivation	Employment development	Students' motivation to learn
	Professional ability	
Learning attitude	Personal cognition	Students' attitude towards learning
	Learning interest	
	Learning readiness	

3.3 Selective coding

Selective coding continues with axial coding at a higher level of abstraction. The aim of this step is to identify core categories around which other proposed categories can be grouped and integrated to form a complete "story line" (Table 4).

Table 4: List of coding codes and categories

Principal category	Subcategory	Frequency
Aspect of difference	Satisfaction degree	7
	Gender difference	16
	Personal readiness	18
Required reserve	Technical readiness	4
	Teacher problem	3
Emergency	Classroom problem	11
	Influence aspect	12
Network influence	Personal influence	15
	Other effects	13
	Learning motivation	8
	Learning attitude	17

4. Research results

4.1 Greater differences in online learning readiness by gender

In combination with the interviews, the students felt that the boys were more sensitive, more flexible and more sensitive to electronic devices, and that the boys were more satisfied with online learning. As most girls are only semi-literate in this area, it is girls who tend to experience more problems when using electronic devices.

"Boys are more comfortable than girls when it comes to using electronic devices, for example, the type of software, boys are mainly involved in games, travel tips (VW) and girls are mainly involved in MeituXiuXiu type p-image software, shopping". (S3)

"There is still a slight difference, in life, boys generally use computers and other kinds of electronic devices than women, boys for hardware, the use of software is also slightly more hands-on than girls, after all, girls usually use more things mobile phone software, such as microblogging, Xiaohongshu, WeChat and other social categories will be a little more, but involving more professional software they will But when it comes to more specialized software they are a bit helpless." (S1)

Boys are more satisfied with online learning than girls, and most of them are interested in using electronic devices to take classes so that they can leave home. And some would hang out on their computers and use their phones to play games because the online teaching teacher could not see what they were doing and could do whatever they wanted. (S10)

4.2 The availability of technology and hardware facilities is a major factor in the readiness required for online learning

Online learning readiness is mainly reflected in technological readiness, such as software equipment, network environment, and network latency. A summary of the current state of technological readiness for online learning can be drawn from the following conversations among several subjects.

"If computer's network lags, it directly interferes with my progress in the online course, when a key point needs to be carried forward and backward it can lead to a complete loss of knowledge, and the lack of electronic resources such as examples or answers can prevent timely answers or completion of tasks." (S2)

When I am suddenly named in an online class, the microphone does not work properly, I cannot

express myself orally, and the code is a waste of time and I cannot answer questions in time. (S3)

"The first time was in my first entrance exam at university, probably because the network was unstable due to the large number of people, so I scored zero on that occasion, but the university later arranged for us to retake the exam; the second time was in the mid-term exam of the accounting course this semester, also because of network problems, the page could not move, so I could not answer the questions and had to re-enter the exam, and there was a a certain number of times, so there are still hidden dangers in online exams."(S1)

"I think it would affect my confidence in online courses. Because in reality, we don't have enough electronic devices and will have problems such as network lag, no signal, etc., which will lead to mental stress or affect the mood of teaching online thus affecting confidence". (S4)

Personal readiness: "If the teacher needs to use the device for interaction during the online class, students who are not familiar with the electronic device or software will not be able to keep up with the progress and will greatly affect their learning". (S5)

"If the problem is widespread, the school authorities may proceed to find another time to arrange the examination, or if it is personal, the teacher cannot estimate all students under strict examination conditions and may be convicted of cheating or other behaviour that will result in the grade being invalidated." (S3)

"It will affect, and if you accidentally jump out of the exam screen in the middle of the exam there is a possibility that you will fail that course as a direct result." (S2)

"There is a slight impact, experiments have shown that people's mental concentration generally does not exceed 20 minutes, beyond this length it slowly decreases and then shifts attention, offline teaching has teacher reminders and voice prompts from classmates, but online teaching lacks the control aspect, it is easy to slacken learning, and if there is a problem with the device, mental concentration is more easily shifted."(S3)

4.3 Emergencies affect online learning readiness to some extent

Emergencies in the online classroom include teacher issues, classroom issues and impact aspects.

In terms of teacher issues, the impact of the teacher's on readiness to learn includes the teacher's technological familiarity and teacher contingencies. "In online classes, the teacher may not be very familiar with how to operate and realize halfway through the class that there is another class that has not entered the classroom; sometimes the equipment for connecting the microphone is not very good and there is a tendency to have noise like electric sounds." (S1)

"Due to the teacher's unfamiliarity with the technology, debugging the equipment before the class did not work and took up most of the class in debugging the equipment." (S6)

In terms of the classroom, unexpected situations make students rub their hands, "When the online class suddenly named itself, it appeared that the microphone did not work properly, could not express their views orally, the code was a waste of time and could not answer questions in time, which was not a small disturbance to me." (S5)

"When using a mobile phone or ipad to teach a class, suddenly the phone rings" (S4). "Poor internet speed drops the line directly and gets stuck out of the classroom; some students accidentally turn on the microphone and affect the teaching progress." (S8)

And this kind of unexpected situation was not expected by anyone, and although it usually occurs, there was no response based on the situation that usually occurs. Therefore, it also had an impact on future online exams.

"Hand-slip exits from the interface during online exams are defined as fraudulent and lose the result of the exam grade, leading to increased trouble for students and teachers." (S10). "Suddenly flashing out of the answer screen can lead to active handing in" and "Online exams often have

situations such as mistakenly touching out and not being able to re-enter the situation or not being able to check for changes after answering." (S5)

"It won't affect my grade because it was reflected to my teacher instantly. The first time was on my first entrance exam at university, probably because the network was unstable due to the large number of people, so I scored zero that time, but then the university arranged a retake for us; the second time was on the mid-term exam for the accounting course this semester, also because of network problems, the page could not move, so I could not answer the questions and had to re-enter the exam, and there is a limit to the number of times you can exit the exam page, so the online exams are still a hidden problem." (S3)

4.4 Intrinsic and extrinsic factors influencing readiness for learning online

Factors that influence students' readiness to learn online include visual impact, student perception, learning confidence and learning motivation. Of these, visual impact and student perception are extrinsic factors, while learning confidence and motivation are intrinsic factors.

For individual students, the internet issue affects students' vision, perception, learning efficiency and learning confidence. "Because we spend a lot of time on our mobile phones every day, we can't live without them, and we have to face electronic products in class, especially when there are a lot of classes, and we also use electronic products for homework after class, so our eyes don't get any rest, which affects our eyesight to a certain extent. Poor internet connection greatly affects the teacher's progress and has a great impact on students' perceptions" (S5). In terms of learning efficiency and confidence, "if the computer is too easy to lag or the internet speed is too slow, it affects the efficiency of the online course, because of network delays, lagging, connecting equipment and the teacher is not familiar with the operation of the online class software. The operation and other problems will have a certain blow to our learning confidence, fearing that during the period of problems, the teacher speaks new, important or their own want to deepen the impression of knowledge, resulting in later classes worried, always easy to lose concentration, and now the software used for classes are mostly Tencent Conference, it is no playback function, so there is a certain degree of impact.". "I can only get to online classes to learn new things better if the internet is good. Bad internet can lead to changes in my mood affecting my attitude towards learning, as well as feeling sad or confused because of not being able to access knowledge properly, which in turn can affect my interest and confidence in learning." (S4)

In addition, internet issues have had a number of other impacts, including confidence in using computers, course progress, and have had an impact on motivation and attitudes to learning.

"During the readiness for online learning, the clarity and resolution of my own computer screen will be understood and when downloading software needed for teaching, it will be analysed as to which disk is better to install it on. This will enable me to understand and use the computer better. But even with my readiness, sometimes network problems or unexpected issues can make me feel that I have readiness in vain, but am not better equipped to deal with them and doubt my computer skills." (S1). "In the middle of a lesson, the teacher's speech is stuck because of network problems, which will cause us to be unable to listen to the teacher's lecture, thus worrying whether we will miss something important in the lesson, being anxious that we won't be able to keep up with the course, and fearing that we won't be able to do well in future exams, which will lead to boredom in the long run." (S7) "My motivation for learning is to complete my coursework and increase my knowledge, motivation for learning affects readiness for learning, as reflected in the motivation to play a good personal initiative, will go in advance to do a good job on coursework prep, on the contrary, without a clear motivation, will not be well readiness for the needs of the course, and even lie flat phenomenon, with a clear motivation for learning to do a good job on learning readiness.".

"In the case of bad network, the teacher's picture, sound, etc. will be affected, then the students want to learn but helpless to learn, and the teacher's teaching task must continue, so it will lead to the students for this lesson to learn missed knowledge points, even if the later self-study back, always will be missing some knowledge points, thus affecting the learning attitude". (S3)

5. Conclusions and recommendations

To better readiness for online learning, based on the results of the interviews, thus making recommendations.

5.1 Using gender differences to improve online learning readiness

In terms of operating software, boys have a higher sense of computer self-efficacy than girls, and boys are more flexible than girls in operating electronic devices; girls have more self-control and concentration in online learning than boys. Therefore, they should support each other according to the gender differences and take online learning help. For example, in terms of operating software, girls may encounter many problems, and boys can guide girls online to install and operate the software; especially before exams, they can do a software demonstration and pre-test simulation to reduce students' exam anxiety and worries. Girls can provide sharing in finding resources and information. Teachers should consider the differences between boys and girls in teaching, randomly assign boys to apply for classrooms before lessons, and do such things as signing in and taking attendance to reduce or eliminate opportunities to play games in class; classroom group work should also be divided according to gender differences to improve learning efficiency.

5.2 Improving teachers' and students' proficiency in the use of equipment (technology)

Some students think that they are not confident enough to learn online because they are very uncomfortable with online learning, worrying about network lag, no signal affecting progress, missing knowledge points and affecting their self-confidence, and always tend to get distracted in class with the software, worrying about affecting their academic performance. For teachers, there is also a lack of familiarity with the operation of the software and less communication with students.

Therefore, teachers should ask students more questions during lessons to avoid them getting distracted; at the same time, they should increase the interest of online lessons to avoid monotony and constantly change the teaching style according to the characteristics of students. Again, according to the different characteristics of the students, we should try our best to pay attention to each student, enliven the classroom atmosphere, look for reasons from the teaching methods, motivate students to learn, encourage them, affirm them and improve their self-confidence.

5.3 Improving the ability to deal with online learning emergencies

Whether you study online or offline, you may encounter unexpected events, which requires teachers to have sufficient teaching resourcefulness and students to have a good learning mindset. Many online learning emergencies are mostly due to unfamiliarity with online learning and exams, and therefore being caught unprepared when encountering unexpected events. For example, when a teacher names a student online to answer a question, the software on the student's end may be unable to connect due to network problems or the device, which affects the student's usual grade, so a flexible note in the form of a chat box can be used to indicate that the lesson is being listened to online. Teachers prepare 2-3 devices, mobile phones or tablets in advance for emergencies and familiarise themselves with the operation of the devices. Only by familiarising themselves with the

class environment and the operation of the devices can they reduce the number of emergencies.

5.4 Clear motivation for learning and correct attitude to learning

Motivation affects the readiness for learning. If you have a clear motivation for learning, you will be ready for learning. This leads to low interest in learning, which in turn leads to the emergence of boredom and can greatly affect readiness for learning. Therefore, you should clarify your motivation for learning, set reasonable learning goals, enrich your knowledge base, grow your intellectual talents and lay a solid foundation for your future work.

Attitudes to learning are something that you are aware of and are not easily influenced by the outside world. Moreover, the internet is not well developed and only our learning tools and learning methods are affected. A good attitude towards learning means that one likes to learn, while the opposite means that one has no interest in learning. Some university students have little self-control, and their attitude towards learning is not correct, and they are easily influenced by the outside world. Therefore, firstly, hardware facilities need to be improved to ensure a smooth network and updated equipment. Secondly, teachers and students should be trained in the technology, using various methods and demonstrating the operation using short videos or texts to readiness for the class. Finally, keep the enthusiasm for learning and feel the joy of learning.

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