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The Changes of College Students' Abilities of Cognitive and Non-Cognitive in Long "Online Learning"

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Abstract: Due to the outbreak of the COVID-19, college students around the world have switched from traditional learning to online learning. What impact has this long-term online learning had on students' learning? This research uses the semi-structured focus interview method to collect data, and uses the grounded theory to analyze the interview materials from college students about online learning. The impact of online learning on college students' cognitive and non-cognitive abilities is mainly concentrated in seven categories: interpersonal communication, learning regulations, learning situation, self-examination learning tools, course form, and teacher status. It directly or indirectly affected college students' learning ability through the environment, relationship, and individual progressive story line. This study found that online learning makes college students' learning scenes and life scenes and entertainment scenes stick together, thus changing the relationship between teachers and students and classmates, making college students more and more tend to self-examine when learning. And because technology filters the real-time non-verbal interaction, and provides a "whether to interact" button for both sides of teaching, it also makes learners only rely on their own feelings and self-examination to evaluate the learning process and test the learning effect, leading to "higher" or "lower" assessment of learning ability.

1. Introduction

Prior to the epidemic, online teaching used to exist as an innovative means of teaching college students, but since the outbreak of the epidemic in 2019, the demand for online collaboration in education, finance, medicine, law, and other industries has increased, and online meeting collaboration platforms have grown rapidly. In colleges and universities, the need to shift from the traditional "offline lecture" mode to "online and offline hybrid teaching" or "online teaching" has become more urgent, and online teaching has become the normal form of lectures for college students. Online teaching has become the normal form of instruction for college students. Given today's uncertainties, it is vital to gain a nuanced understanding of students' online learning experience. [1] When the boundary between traditional physical "place" and virtual "cloud" is blurred, how will the cognitive strategies, learning motivation, learning concepts and emotional behaviors of college students in the learning process change?

Some research are support the conclusion that online learning has more positive impact on learning of college students than other students [2], such as in medical education [3], but most of the research are believe that long time online learning will lead to anxiety among college students [4], and college students did not prefer e-teaching over face-to-face teaching during the lock down situation [5]. Therefore, the effects of online learning on college students' learning vary from different perspectives. Therefore, this article is not intended to determine whether long-term online learning will have a positive or negative impact on college students, but rather to determine which factors specifically affect the learning process of college students. To answer these questions, this paper focuses on the learning process of students and explores the impact of the online learning on the cognitive and non-cognitive abilities of college students, with a view to improving the understanding of this new educational tool and providing a reference for optimizing the design and management of the learning process.

2. Literature Review

Does the medium have an impact on people's accumulated knowledge? Communication scholars have answered this question through many researches, such as the discursive network proposed by Kittler based on Foucault's "archaeology of knowledge", and empirical researches such as the classical "knowledge gap" and "connotation/cultivation" theories in the history of communication. "These studies have confirmed that "media" has various relationships with "knowledge acquisition" and "cognitive behavior". As the epidemic continues, learning through media software has become the norm for college students, who have gone from being present face-to-face with teachers in physical space to having to communicate and learn through media software, such as Tencent software. In this context, students' perception of the classroom, their mastery of knowledge, and even their emotions toward their classmates and teachers can be different than before. Based on this, this study introduces the concepts of cognitive and non-cognitive abilities in psychology and observes the effects of online learning on college students from the perspective of communication science.

2.1. Concepts and Measurement of Cognitive and Non-cognitive Abilities

Cognitive ability is one of the important functions of the brain, mainly referring to the brain's processing function of information [6], which reflects the "inner" ability of human beings [7], and in learning, it mainly refers to the ability of literacy and memory [8]. In short, cognitive ability refers more to students' skills in mastering the hard knowledge of the curriculum, and its magnitude can be directly reflected in learning performance or learning outcomes, so it used to be a criterion for assessing the success of students' education. However, with the reform and change of educational philosophy, many scholars gradually realize that only cultivating students' cognitive ability is not enough, especially in higher education, it may also need to enrich other aspects of students' learning, non-cognitive elements are born. By non-cognitive competencies, we mean the more stable thoughts, emotions and their conceptually guided behaviors that individuals possess [9]. Its elements mainly include students' personality traits, meta-cognitive strategies (i.e., individuals' monitoring, regulating, and managing activities of cognitive processes), emotional activities and social interactions in the learning process, epistemological beliefs, and conceptions about education and learning [10].

Because of the above differences in the characteristics of cognitive and non-cognitive abilities, cognitive abilities are relatively better measured, for example, through recall and understanding of course content before and after the course. However, the concepts and strategies of non-cognitive abilities are relatively lacking in standards, for example, Le Junjie et al. classified non-cognitive

abilities into thinking openness, due diligence, extraversion, and neuroticism [11]; while some scholars defined them as all aspects except academic abilities. As the knowledge of cognitive and non-cognitive abilities has deepened in the field of student education, some scales for cognitive and non-cognitive abilities have emerged, including the "Learning Patterns Scale" developed by Vermunt and colleagues in 1996, which has been refined by researchers for decades and translated and used in several countries It has demonstrated good reliability and validity, and basically identifies four cognitive and non-personal elements of student learning, namely, cognitive processing strategies, meta-cognitive strategies, educational and learning perspectives, and motivation [12], as shown in Table 1.

Table 1: Learning Model Scale

<table>
<tr><td>Cognitive elements</td><td colspan="3">Non-cognitive elements</td></tr>
<tr><td>Cognitive processing strategies</td><td>Meta-cognitive strategies</td><td>Education and Learning Perspectives</td><td>Motivation for Learning</td></tr>
<tr><td rowspan="6">1.Deep processing strategies
2. Representational processing strategies
3.Concrete processing strategies</td><td rowspan="6">1.Self-Management and Discipline
2.External management and constraint
3.Lack of management</td><td>Construction of knowledge</td><td>Personal interest</td></tr>
<tr><td>Knowledge absorption</td><td>Certificate orientation</td></tr>
<tr><td>Use of knowledge</td><td>Self-testing</td></tr>
<tr><td rowspan="2">Motivated education
Cooperative learning</td><td>Career orientation</td></tr>
<tr><td>Ambiguous goals</td></tr>
</table>

2.2. The Influence of the Media on Cognitive and Non-cognitive Abilities

What are the effects of media on cognitive and non-cognitive abilities? There are many studies that have confirmed positive and negative effects, but in the current literature, there is a difference in the focus of studies that have demonstrated positive and negative effects, and these differences can help to improve this study. The positive effects of media technology on people's cognitive and non-cognitive abilities emphasize more on the learning effects that can be achieved through media technology means, for example, Liu Yang et al. found that the application of educational software had significant positive effects on students' academic performance, problem solving ability, cognitive ability and self-regulation ability in cognitive aspects, and on learning attitude and interest in learning in non-cognitive aspects [13]. The literature on students also supports this part of the findings, but researchers emphasize the impact on cognitive ability more than those who study other groups, for example, Lou Puyu et al. found that the context-enhanced learning environment of "virtual reality + PPT" helped students to develop model cognition effectively and ensured the learning effect in the online teaching of chemical reaction principles [14]; Sullinson et al. found that online learning could improve children's language and writing performance [15].

The negative effects of media on human cognitive and non-cognitive abilities, especially on adolescent students, are more emphasized in the media environment and inappropriate ways of using media. They found that learners were not fully adapted to the new learning environment when they used the Internet for independent learning; they were not fully adapted to the learning resources, paradigms, management and evaluation of this environment, and they showed tendencies of anxiety and depression. Among the national and international studies describing the negative effects of media technology on cognitive and non-cognitive abilities, more studies point to the negative effects of "media-related multitasking" on both cognitive and non-cognitive abilities of adolescents. Available evidence suggests that media multitasking is directly or indirectly associated with an increased risk of obesity, socialization, attention deficit hyperactivity disorder, cognitive decline, and anxiety and depression in adolescents [16]. Meanwhile, media multitasking is

associated with different cognitive processes in adolescents, and frequent and prolonged media multitasking can impair attention, cognitive control, and executive functioning [17].

Combining the findings of the existing literature on the analysis of the cognitive and non-cognitive effects of media technologies on people can be added to improve the present study. However, from a methodological perspective, most of them have adopted the path of empirical research, such as using regression analysis, which may not be in-depth for studying college students in the online classroom environment. In the current online classroom environment, college students' online classroom environment is complex, and they not only need to accept the massive amount of information related to learning, but also face the problems of environmental adaptation and "multitasking", and its influence is comprehensive. This paper adopts an interpretive and qualitative approach to scientifically reduce the changes in cognitive and non-cognitive abilities of college students in the online class environment. Therefore, this paper finally chose to fall into this specific scenario of online classes for college students to examine, in order to obtain results that are closer to the research subjects.

3. Sample

Compared with in-depth interviews, focus interviews have the characteristic of "group", which can set up an environment to stimulate the ideas of the interviewees, and due to the impact of the epidemic and the prevalence of "Internet classes" among college students, the typicality of in-depth interviewees is not obvious. Due to the impact of the epidemic and the universality of college students' "Internet classes", the typicality of in-depth interviews is not obvious, and the significance of selecting a typical sample is not significant. Therefore, this paper adopts the method of randomly selecting focus groups among college students to conduct semi-structured focus interviews. Three focus groups were used in this study (see Table 2 for the basic information of group members), with the number of each group ranging from 6 to 8, and the length ranging from 60 to 90 minutes. In order to evoke the recall and discussion of the interviewees, focus group interviews were conducted using Tencent meetings, and a total of 27,000 words of interview data were obtained.

Table 2: Statistics of the focus group interviews and basic information of the interviewers

Group	Number of people	Gender	Academic qualifications	Duration
1	8	7 Female, 1 Male	5 undergraduate, 3 graduate	75minutes
2	7	3 female, 4 male	6 undergraduates, 1 graduate student	90 minutes
3	7	7 female	6 undergraduates, 1 graduate student	150minutes

Vermunt et al. created the Inventory of Learning Styles Scale (ILS) based on empirical material, containing more than one hundred questions for quantitative investigations, which has been translated and used in more than 30 countries and has been refined over the years to prove good reliability [18]. Because of the complexity of the factors included in the learning process and the high reliability of the scale, the scope of the learning process study can be delineated, so this paper draws on the scope of the scale to design a semi-structured interview outline, but emphasizes the concepts of "online environment," "online teaching," and "online class" in the questions. The concepts of "online environment," "online teaching," and "online class" are emphasized in the questions.

4. Methods

This study will use semi-structured focus interviews to obtain data from the perspective of college students' learners, analyze the interview materials based on sing Grounded Theory, based on Nvivo12 plus, and the results were obtained after three-level coding of "open coding - axial coding -

selective coding". First, in open coding, a total of 35 initial concepts were finally obtained by summarizing the interview materials. In this paper, 24 initial categories were summarized on the basis of the concepts and sorted. Second, in axial coding, based on the 24 initial categories of open coding, 7 core categories were extracted. The final step is selective encoding. The Selective Coding was designed to further address the relationships between the categories and to establish the connections between the core categories and other categories. The core categories in this study are structures that influence the cognitive and non-cognitive abilities of college students to learn, and this paper builds a relational structure around direct and indirect influences that affect the learning process, as shown in Table 3.

In addition to this, the learning subject, i.e., the student, is the center, and contains three categories of categories: subject (student only), relationship (student-teacher, student-student), and environment (ritual, atmosphere, feeling), and the structure of the relationship between them is layered, even with causal connections, i.e., the change in the environment, which leads to a different relationship, makes the final formation of a change in the subject's mentality, forming a story line.2 When this story line overlaps with the previous one, see Table 4.

Based on the axial and selective coding, the story can be organized, that is, the direct impact of "online classes" on college students' learning is related to "interpersonal communication", "Learning Regulations" and "teacher status", which are related to the teacher relationship and the relationship with classmates. "Course format" and "teacher status", as well as "learning situations" in the environment that include relationships and technology use; and the indirect influence on learning is the "self-examination" of the learning subject and the "learning tools" in the environment. In addition, the change of environmental factors such as tools and situations directly brings about the change of relationship, and directly drives the change of the subject, and makes the subject to self-examination. Based on this, the model is finally organized in Figure 1.

5. Research Results

5.1. Environment: Cutting and Restructuring

Environment is a broad concept, and although it has different definitions in different disciplines, it basically encompasses the idea of an ecological and holistic condition of existence that includes people, objects, space and time. In the case of learning, this environment is not a holistic condition of existence, such as "natural environment" or "living environment", but rather tends to be a "context" or "situation" that includes people, objects, space, and time when certain types of behavior occur, as mentioned in sociology and communication. A "situation" or a "scenario". The most representative definition of this scenario belongs to Goffman and Meyrowitz, where Goffman believes that each person plays a different role in the social arena and adjusts his or her behavior according to the situation he or she is in [19], and that different scenarios lead to different behaviors, where the division of scenarios is often based on material space, such as the classroom, the auditorium, the bedroom, etc. Meyrowitz, on the other hand, builds on Goffman's theory of "information flow systems" and argues that the construction of scenarios of people's interactions should transcend geography, with the physical space of the location creating only an information system of live interactions, while other communication channels create many other types of scenarios. The online class scene is also the information flow system that relies on electronic media to form a distinction from physical space, and it is changing the behavior of college students' learning.

In the interviews, many students used words such as "no learning atmosphere", "no feeling of learning", "no sense of ritual ", etc. when explaining the change in learning behavior. 1FM6's quote is representative, as he believes that offline classes have a sense of ritual and deepen a sense of the

learning scene. He believes that offline classes have a sense of ritual and deepen the understanding of the learning scene, while online classes can blur the life scene and the learning scene, to the point where it is impossible to distinguish between online classes and online entertainment.

Table 3: Main category relationship diagram

Structure	Axis code	Path connotation	Representative Statements
Direct Impact	A1 Interpersonal Communication	Personal interactions directly affect the level of cognitive and non-cognitive abilities of college students	1FB5: When we do group work together online, there will be less interaction and discussion, and the work done will be very rigid.
	A2 Learning Regulations	Learning Regulations directly affects college students' cognitive and non-cognitive ability levels	2MB6: For me, self-control is a superpower. In online classes, if I'm not supervised, I might start listening for five or six minutes and then desert.
	A3 Learning Situation	The learning environment directly affects the level of cognitive and non-cognitive abilities of college students	1MB2: It is just obvious from the report card that offline is really much more efficient than online, and the learning atmosphere is different.
	A6 Course format	Course format directly affects the level of cognitive and non-cognitive abilities of college students	2FB7: I think offline is definitely richer than online. For example, there are other practical classes such as PHOTOGRAPHY that are not available online.
Indirect Impact	A4 Self-examination	Self-examination indirectly affects the level of cognitive and non-cognitive abilities of college students	3MB2: Online classes do not make much difference in terms of motivation to learn, but may lead to more self-imposed anxiety.
	A5 Learning Tools	Learning tools indirectly affect the level of cognitive and non-cognitive abilities of college students	2MB5: Online classes are much better than offline classes in the learning effect, take notes and check the data are all too convenient.
	A7 Teacher status	Teacher status indirectly affects the level of cognitive and non-cognitive abilities of college students	2MM4: With online classes, the teacher will have a slacker mentality, such as no one checking in on the class or whatever, which leads to a less engaged class.

Table 4: Selective coding two story line collations

Story Line 1	Axis code	Story line 2
Indirect Impact	A5 Self-examination	Subjects
Direct Impact	A1 Interpersonal Communication	Relations
	A2 Learning Regulations	
	A6 Course format	
	A7 Teacher status	
	A3 Learning Situation	Environments
Indirect Impact	A5 Learning Tools	

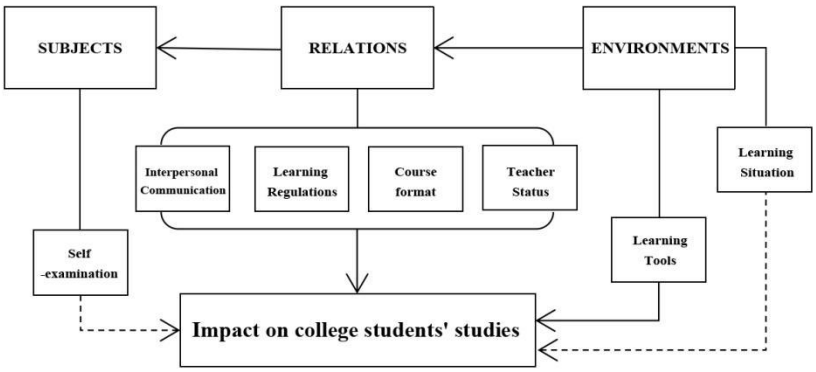

Figure 1: Model of factors influencing the cognitive and non-cognitive abilities of college students' learning through online classes

Traditional learning you have to go through a process of getting up and going out, walking to the classroom, opening your book bag, taking out your notes and waiting for the class, which is a ritualistic behavior, including coming to a very immersive classroom, and then surrounded by your classmates, which will deepen your understanding of the learning scene, and you know you are here to learn. But in a class at home, you might be in your pajamas or on the computer, just waking up, and you won't know very well that you're learning. (1FM6)

When the learning scenario is divided by the criteria of Meyrowitz's "information flow system", it is obvious that the traditional learning scenario is different from the online learning scenario, which is a single information system completely dependent on physical space with walls and doors as partitions. Trying to cross this boundary. But "even if you are looking up information, you always feel bad about fiddling with your phone in front of the teacher, there is a sense of embarrassment (1MB2)". Online learning, on the other hand, is a digital learning information system built on electronic media, whose presence is interlinked with other spaces on the web on the one hand, allowing students to wander through various scenarios without realizing it. "Listen for five or six minutes and then desert, for example, open some software for catching up, and go catch up or play games, etc. (2MB6)". On the other hand, it is also glued to the physical space in which students and teachers live, making this information system full of noise and leading to changes in students' learning behaviors or oscillating between learning behaviors and recreational and living behaviors.

In such a noise-filled learning scene, both learning and teaching subjects need to make greater efforts to maintain the boundaries of the scene at the same time, and they may do so by limiting the physical space such as joining the on-line class in a “quiet park” or “libraries”, Or by limiting their behavior, such as "not answering cell phone messages" during class, "not looking up information in class" and other ways to avoid, but still may be affected by the information noise generated in the physical space, so many students think that online classes "there are many temptations to interfere".

I am at home in the Internet class, my grandmother especially like to come to me to talk. When I was in high school she liked to do so, but went out when I told her I was studying. But now the on-line class, she came in to see me, do not know what I’m doing, she maybe thinks I am playing the computer or my cell, she keeps talking to me, and then I have to reply to her. (2FB2)

Of course, many students believe that this kind of learning scenario, which is untethered from the physical space, will achieve better learning results, such as "independent thinking", "motivating oneself to use online resources", and "helping oneself more to clarify the learning process". Offline courses are more or less influenced by the status of other students, such as 'I've learned what others have learned', but not online, where learning is more clear (3FM1)". However, these effects are achieved with the premise that students themselves can guard the boundaries of the scenario.

Offline courses rely on the constraints of spatial boundaries, on the constraints of teacher-student relationships and classmate relationships; while in online courses, the only subject that can be relied on is themselves.

The online class has transformed the information system in which the class takes place, from a learning scenario established by the interaction of classmates, teachers, and physical space to a scenario established by the interaction of students themselves, technological objects, and virtual space (both the original classmates, teachers, and information space such as Baidu and Weibo). For example, several students mentioned that the most convenient aspect of online classes is their instrumental properties, such as "checking information," "live streaming," "recording classes," and "taking screenshots", which are all experiences gained from interacting with technological objects. In general, the starting point of online learning behavior is the reorganization of the learning scene from a single information system that relies on physical space to an information flow system that combines multiple information systems online and physical space information of both participants in online classes. Such a change of scenario has two effects: on the one hand, it changes the classroom and the form of classroom constraint that relies on teacher-student and classmate relationships, and on the other hand, it increases the individual learners' examination of themselves.

5.2. Relationship: Two-way Interaction under One-way Control

The relationship refers to the interaction between things, a state of mutual influence, that is, an interactive, reciprocal a process. Because of the changes in the learning scenario, the relationships in the learning process have also changed explicitly, and are focused on the changes in the teacher-student relationship. In the interviews, when we asked the respondents to choose using Vermunt's learning type scale, most of the students agreed that the ideal.

That is 1) online classes should be a mutual process for both the teacher and the student, and neither one of them can complete it if they are in bad shape or not committed; 2) online classes are really my own task, but I need the teacher's help.

Even in the interview materials, at least 15 reference points mention that online classes "need more help from teachers (3FB3)"than offline classes. And what do you need the teacher's help with? The words "interaction" and "guidance" were often associated with this. However, in the view of the students, the demand for such two-way interaction between teachers and students in online courses is difficult to achieve. According to the open coding, the most frequent reference node is "interaction", and its attribute is almost always negative, i.e. "lack of interaction", and the lack of teacher-student interaction is the deepest impression of the students' online class. By combing through the story line, we found that there is an implicit clue that "online classes lack interaction, so they need teachers to help, and teachers need to guide the interaction to help learning", which means that the interaction of online courses is actually a kind of teacher-led interaction, a kind of interaction with conditions, or rather with prerequisites and technical thresholds.

This is obvious in 1FM8's description, he mentioned: "Although Tencent Conference can open voice communication, but if the teacher does not guide, generally will not say direct communication, so it is a more one-way information exchange than the offline classroom", and in 1FM7's speech can be felt in the "interaction is not enough - need teacher - guide interaction - interaction is not effective - need teacher" between the constant repetition, although it is about "interaction", but in fact, the emphasis is more teacher-led interaction.

Online is more need of teacher's help, but this will face some problems, because you need to go to open voice communication, or in the comment section to interact, but offline, this real interaction teacher is able to detect the students' expressions and other subtle changes, and then go to focus on the difficult points to explain, but the effect of online interaction is poor, so that will be more

objective need of teacher's help, but In fact, it is more important for me to expand in class and learn more by myself. (1FM7)

From 1FM7's speech, we can see that the offline course is a complete information system, including a lot of information, such as "student's reaction", "eye contact" and other non-verbal symbols, in addition to the teacher's lecture, while the online course filters all the non-verbal symbols and only retains a few "actionable" buttons such as open video, raise your hand, and go to the microphone, making the two-way interaction in the learning process into an interactive mode led by the teacher. This may result in students missing out on interaction if the teacher does not interact at the "right" time (which is actually done offline by a single eye contact between teacher and student), and students not being able to interact effectively when the teacher deems it appropriate to do so. Especially with the intervention of technology, "online classes" provide both teachers and students with an option to "interact or not", so that interaction is no longer the instant, immediate, and inescapable interaction in offline classes, but rather an interaction that requires choice, consideration, and the filtering of redundant information. This leads directly to the phenomena described in several main categories in the relationship section, such as the feeling of a single Course format, lack of interpersonal interaction, lack of classroom discipline, and the impact on teacher status.

Suffice it to say that the online class platform provides a two-way choice model that is instructor-led, but at the same time leaves it up to the instructor and the student to decide whether or not they want to interact. This leads to two outcomes: on the one hand, students are eager for teacher-initiated interactions to help them focus and learn more effectively, but on the other hand, students are resistant to unilateral teacher-initiated interactions that are entirely from the teacher's standpoint, because some of these interactions seem unneeded or inaccurate to them. This was evident in the interviews. On the one hand, students kept mentioning the need for a teacher to lead the class, as there is no teacher-student interaction in online learning without a teacher-led approach, but on the other hand they had a range of means to resist interaction. For example, "I tend to swing the computer up a little, and then only see a brain, see a ceiling or something (1MB2)" "I act like I'm listening carefully on camera, but I'm probably already dazed (2MB6)" "Pretend the video is down (3FB3)" "The signal is bad, or the mic is broken (2FB7)". In short, there is a great deal of "room for maneuvering".

At the same time, this study found that students had very high expectations of teachers' performance during online classes. The word frequency analysis of all the interviews by Nvivo showed that "Teacher" ranked first, even surpassing the core word "Learning", see Table 5.

Table 5: Word frequency statistical table of text materials

Number	Word	Similar words	N	%
1	Teacher	Teacher	201	2.48
2	Learning	Learning; Learn; learns; learned; learnt; study; studied;	201	2.48
3	Course	Course	141	1.74
4	Interest	Interest	53	0.65
5	Classmate	Classmate	52	0.64
6	Help	Aid; assist; assistance; support; hand	44	0.53

However, in terms of the coding attribute of the "Teacher", students generally believe that this expectation of the teacher is invalid, and most of them presume that the teacher is also affected by the negative status of the online class, such as "I have met a very serious teacher offline who is paddling online (2FB2)" "The network is stuck, the teacher is in a bad mood, (1FB3)", etc. In other words, on the one hand, students think that online courses lack interaction and need teachers' help, but at the same time, they think that the existing technical conditions simply cannot achieve any

effective interaction, so they take to avoid online interaction and develop the idea of "learning on my own", which in turn exacerbates the lack of classroom interaction, thus leading to the course "boring" and "monotonous", leading to "poor teacher status" and "reduced social motivation (3FM1)". Behavior, as 2MB5 said, "On the online platform, it is particularly difficult to listen to the lesson, sometimes it is better to look up the information and learn it by yourself, in fact, it is not a problem (2MB5)."

5.3. Subject: Self-Examination

With a learning environment full of noise and less interaction with teachers and classmates than offline, students' attitudes towards learning, the effectiveness of learning, and the management of the learning process ultimately come back to themselves. This shows that although everyone thinks that it is ideal to have a joint class with the teacher and to gain knowledge with the help of the teacher, in reality everyone thinks that the first person responsible for learning should be oneself and only oneself. In other words, the change in the online course environment and relationships has led the subject of learning to move increasingly towards self-examination in the learning process, the results of which affect all learning outcomes in an indirect, but more lasting form. Here, self-starting interest becomes the only constraint on whether one will listen attentively, complete class tasks, and learn actively; students' self-evaluation in the learning process becomes the only indicator of the entire learning process.

First of all, "Interest" appears frequently in the interviews, and there is an implicit set of oppositional phrases related to it, "*romanticism and realism, interest and utilitarianism (3MB2)*". In the motivation section, most of the students mentioned the phenomenon that "t*here is no difference between online and offline motivation*", that is, some classes are "ROMANTIC" because of interest and pursuit of knowledge, while others are "REALISTIC" for credit orientation, career orientation, and student tasks. In other words, they believe that there are classes, both online and offline, that are not of "Interest" but have to be taken for credit and student responsibility.

But there is a huge difference between online and traditional learning of these courses. In the case of non-online situation, all classes "have to listen" and must listen; while online some "*have to listen*" class, perhaps can "*pretend to listen*", because the online supervision, interaction, regulation In fact, the role is not much, can be "*manipulated* ", which leads to learning online whether to learn ultimately rely on the point of interest, relying on their own subjective judgment, in the interviews such as some of the views:

1) Online classes, especially the kind of online classes that don't open video, are not interesting some times and it's really easy to slack off. (1MB2)

2) The difference between online and offline classes is not too big, the more interested in the class even online, I will listen carefully, if I do not like the class, online is I will just hang it, regardless of it, in short, the learning effect is based on personal interest. (2FB2)

This means that classes in which students have "no interest" will no longer be judged by students who enter the classroom first, as in offline classes, or by students who are coercively regulated through relationships and environments, but will be abandoned in a completely "FORMALISTIC" manner. Here, interest becomes the only thing that brings students back to the classroom online, instead of being the motivating factor offline. The result is twofold: on the one hand, when "*the course tends to take itself as the starting point, (there is) a sense of aimlessness (3FB4)*"; on the other hand, the "Interest" in the course is actually declining due to the overall lack of environment and interaction in the online class.

At the beginning, the efficiency of online classes was not that low, but the more I got used to it, the more I don’t listen to classes, unless they were of special interest. In the class, if there is no

choice, I will listen; but if there is a choice, the importance of the class will take a back seat, unless there is really nothing to do. (2MM4)

Second, when the online evaluation system does not work (easier to cheat, simpler questions) and there is no effective interaction, self-evaluation becomes the only indicator of learning and becomes an indirect but continuous influence on student learning. But such a self-evaluation, which lacks contextual information and effective relational feedback, is actually very difficult to make a fair judgment, for example, some students think they have achieved a "corner overtaking (2FB1)", while others become anxious and even reflect on the context of the times. This means that the final outcome of learning is only related to "self-discipline" and has little to do with school regulations, classroom records, etc. This obviously requires more of the individual student and makes learning more likely to be at the "better" or "worse" end of the spectrum.

6. Conclusion and Discussion

In general, the impact of "online classes" on the cognitive and non-cognitive abilities of college students is mainly direct, such as the single classroom, but also more lasting indirect, such as self-examination. These effects come from three main sources: environment, relationship, and subject. First, at the environmental level the learning scene is cut and reconstructed, leading to changes in the relationships within the scene and changes in the way subjects perceive and behave. Second, at the relational level, with the intervention of technology as a mediator, the interaction in the online classroom changed from a face-to-face, self-explanatory, and all-around instantaneous interaction to a teacher-led interaction that gave both teachers and students a choice, which made students more eager to interact but resistant to such interaction. Finally, when the environment and relationships change, self-examination becomes central to learning, and the decision to learn is made subjectively by the student, with the only criterion for learning effectiveness being whether or not the student believes he or she has achieved self-discipline. Based on this, this paper argues that online classes have an impact on both the cognitive and non-cognitive abilities of college students to learn.

However, this paper does not go on to explore which of the cognitive and non-cognitive abilities of college students are affected by these influencing factors, which should be the direction of the next study. In addition, this paper only examined the impact of "online classes" on college students' learning from the student side, perhaps neglecting the collection of data from the teacher side, which should be improved in the subsequent research. In general, the results of this paper have some universal significance and can explain the impact of some online courses on college students' learning, but two issues should be noted in the process of promoting the results. First, it is obvious in the interviews that students have a "third person effect" on the effect of "online classes" on learning, i.e., they think that others are more likely to be affected but not themselves, so they have a certain tendency in their statements; second, the interview period of this paper is the late stage of the epidemic, and students' memories of "online classes" are mostly related to the period of the epidemic, so they inevitably have a social structure in their statements. This should be different from the psychological state of intermittent "online classes" and different from the findings of other studies on "online courses".

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