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The Impact of Instructional Interaction on College Students' Engagement on Distance Learning post-COVID19

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Abstract: Online learning developed rapidly after the outbreak of COVID. However, learning engagement is an important indicator for evaluating the quality of teaching and learning, and the poor results have attracted extensive attention from scholars at home and abroad. This research adopts a qualitative research method to explore the influencing factors and challenges of exploring college students' learning engagement post-Covid-19 by launching a convenience sampling survey of seven students and three teachers from Hebei Normal Universality of Science and Technology, using the interview method to conduct the research. The results show that: teacher-student interaction, student-student interaction, and student-content interaction affect learning engagement; learning motivation and problem-solving ability also affect interaction and learning engagement. These studies have important guiding significance for applied undergraduate online teaching in China.

Keywords: Instructional Interaction; Learning Engagement; Distance Learning Education.

1. Background

At the beginning of 2020, COVID-19 swept across the globe, seriously affecting not only people's daily life and industrial and agricultural production, but also the education sector. According to statistics, as of April 2020, more than 191 countries and 1.57 billion students, or 87.1 per cent of the world's total number of students, have been suspended from classes due to the inability to attend classes, thus affecting their learning. Along with China's "no class, no school" notice, China's Ministry of Education has launched 24,000 courses on 22 online course platforms, and colleges and universities are using synchronous live-streaming tools such as Tencent Classroom and Nail to carry out online teaching and learning activities in an orderly manner (Huang et al., 2020). As a result, online learning has gained rapid popularity and development.

The rapid spread of information has demonstrated the incomparable advantages of intelligence, interactivity, openness and convenience, accelerated the popularity of online education, but also exposed many problems. For example, the engagement of students in the online learning is not ideal, and the continuity and efficiency of participation is poor: lazy action in the learning process, speaking and questioning are not active, the scope of communication is small, and they are indifferent to the results of learning; student-to-student exchanges are passive, and there is a lack of deep thinking in online teaching. Therefore, in order to solve many of the above problems and explore the influencing factors of learning engagement, a lot of research has been done on the basis of previous researchers.

2. Literature Review

2.1. Self-determination Theory

Self-determination theory was developed in the 1980s by American psychologists Deci Edward L. and Ryan Richard M., among others, as a theory of the motivational processes that underlie human self-determined behaviour (Deci & Ryan (1980). The most recent development in motivation research is the self-determination theory, which goes beyond the assumption of human beings as behaviours to human beings as rational beings by integrating attributional and self-efficacy theories, and is based on a humanistic approach that constructs three intrinsic human needs: competence, relationship, and autonomy. needs: competence, relationships and autonomy.

2.2. Online Learning Engagement

Learning engagement is a comprehensive representation of the individual's energetic, cognitive depth, thinking flexibility, and emotional experience during the learning process, which is a reflection of the learner's comprehension of the nature of learning and immersion in it (González & Paoloni, 2015).Hui & Feng (2023) used structural equation modelling to explore the internal mechanism of learning engagement and its relationship to online self-efficacy in terms of cognitive, affective, and behavioral dimensions. Wang & Cai (2023) found, teacher-student interaction, student-student interaction, students' learning attitude, and motivation directly affect learning engagement through interviews with 14 master's students that course format. Gao (2016) investigated the effects of academic mood and external learning motivation on online learning engagement, and pointed out that external motivation with higher autonomy can promote online learning engagement and positive academic mood can produce a positive sense of learning efficacy and the degree

of online learning engagement. From the analysis of the above studies, it is found that there is a lot of literature on e-learning engagement from the perspective of teaching and learning interaction. However, there are not many studies on how to explore the cognitive, affective and behavioral engagement of online teaching from the internal mechanism of student learning.

2.3. Instructional Interaction

Instructional Interaction &teaching interaction is a process in which learners and the learning environment communicate and interact with each other in pursuit of their own development (Chen & Wang, 2016). International research on teaching interaction is mostly used, Moor (1989) proposed that teaching interaction is divided into teacher-student interaction, student-student interaction, student-teaching content interaction, etc. Liu et al., (2021) proposed that good teacher-student relationship can improve students' online learning performance, teaching quality. The biggest problem of current online teaching is the serious lack of cognitive, behavioral and affective learning input, and teaching interaction is the main reason for this phenomenon.

2.4. Motivation

Motivation is to stimulate the individual to participate in learning activities and guide the individual towards a certain direction or goal, which is an intrinsic lasting learning process. Motivation is generated on the basis of needs and the generation of motivation should have at least two conditions: one is a need; the second is to have an object that satisfies the need. Leng et al., (2017) on the basis of existing motivation theory, construct the motivation structure hypothesis and form the corresponding questionnaire, and then conduct a questionnaire survey on students of secondary vocational health schools to understand the current situation of the structure of the motivation of learning for students of secondary vocational health schools. Ren (2021) The study on the internal and external motivational failure of online foreign language learners found that there are still limitations, and the analysis of learner and non-learner factors is not deep enough. Xiang et al. (2022) explored the mediating role of learning input between motivation and burnout and the moderating role of personal growth initiative on this mediating process.

2.5. Problem Solving Ability

Problem solving ability is one of the core competencies of students' 21st century skills and it is an important part of advanced thinking ability (Wang, 2011). Therefore, it is very necessary for colleges and universities to improve college students' problem-solving ability. Problem solving ability is divided into six sub-competencies, including the ability to understand the problem, the ability to identify the problem, the ability to formulate the problem, the ability to solve the problem, the ability to reflect after the problem has been solved, and the ability to communicate the solution to the problem. Scholars have done a lot of research on problem solving competencies such as Simamora & Saragih (2019) guided discovery learning based on learning materials with significantly improved students' mathematical problem solving competencies and self-efficacy through a study of students' mathematical problem solving, .Kim et al (2018) found that Increasing social value creation through awareness of new opportunities for students through a study of Korean universities engaging in entrepreneurship education and their results showed that problem solving ability positively affects innovative behaviour and opportunity perception. Mathew et al. (2019) worked through a game to improve problem solving skills of beginner programmers in an introductory programming course, which helped most of the students to understand the programming concepts, structures, and problem solving strategies.

3. Research Methodology

3.1. Research Design

The purpose of this study is to understand the influencing factors of online learning engagement of college students in Chinese universities. Faculty and student learning engagement in teaching and learning interactions such as: teacher-student interactions, student-student interactions, and student-content interactions. Online teaching is still in its infancy, so it is necessary to conduct a comprehensive and in-depth investigation to understand the challenges faced. Therefore, interview research in qualitative research was chosen for this study. Based on the following reasons:

(a) Interview is low cost working method and the complex online teaching facing various problems and challenges. It is better to use qualitative research method (interview) to understand the situation in this dynamic environment.

(b) Interview can help to understand information on various qualitative topics through face-to-face meetings with the interviewees. The actual situation of online teaching and learning, some of which are not directly available from quantitative data.

(c) Face-to-face meetings with the interviewees were useful in obtaining information on various qualitative themes, including the reasons for the low level of commitment to online teaching and learning implementation, the process, discussions and feedback.

(d) Interviews with a variety of students could have provided stronger insights that would have enhanced the reliability and validity of this study.

3.2. Data Collection

The study used convenience sampling technique to collect data among the identified target group. The data collected was analyzed to understand the influencing factors and challenges of online teaching and learning. The data collected was analyzed to understand the challenges of online learning inputs. The scope and nature of this study is precise and deals with the influencing factors of online teaching and learning engagement. Therefore, students from different majors were selected to be interviewed which is the representative of the faculty members of different disciplines.

3.3. Research Procedures

The respondent was contacted and an invitation letter was initiated through the student's counsellor, which facilitated a high level of interest from the student. The counsellor was asked to explain in advance the significance of participating in the research and part of the university research project which would enable the front-line staff to understand the current state of online teaching and learning and make improvement online teaching and learning. A data collection guide was sent to the respondents so that they could familiarize themselves with the research topic in advance. So, the data was collected through prearranged interviews.

3.4. Sample Selection

From the sophomore students of 16 colleges in Hebei University of Science and Technology Teacher Training College, one student representative was found from each of the majors of computer science, art, financial management, law, civil engineering, education, and agronomy, for a total of seven, coded S1, S2, S3, S4, S5, S6, and S7. three teacher representatives were taken from the disciplines of teaching computer science, Chinese language, and career guidance, T1, T2, and T3, for a total of 10 people, of which T1 is the head of the computer science discipline, who is responsible for teaching arrangements for the development of training programme, and so on. Subsequently, the research was conducted through face-to-face interviews with the above 10 people. We can see the Fig 1



Figure 1. Face-to-face interviews with the above 10 people were studied

3.5. Research Questions

Table 1. Research Question

No	Question	Dimension
1	Have you ever taken online courses (teaching online courses)? If so, give an example of an online course platform.	Experience
2	Why do you choose online courses?	Reason
3	How long does your online course last?	Time
4	How do you feel about choosing to study online?	Feeling
5	What are the advantages and disadvantages of online teaching?	Advantages and disadvantage
6	What do you think are the factors that affect online teaching?	Factors
7	for the overall evaluation of teachers (students), are you engaged in on line courses? What is the engaged problem?	Engaged or not
8	Do you have strong desire to engagement in online course?	Motivation
9	Do you have the problem-solving ability to deal with online issues?	Problem-solving ability
10	Do you participate in the interaction and communication between learners in online course teaching?	Interaction

The targeted questions are designed before the interviews, which mainly from the online class experience, reasons for online classes, frequency of online classes, time of online classes, feelings about online classes, strengths and weaknesses of online classes, factors affecting the effect of online classes, learning investment, learning motivation, interaction, problem solving ability, and other 10 aspects of research. In order to comprehensively understand the overall situation of online learning investment and the factors affecting learning investment, the questions are shown in table 1.

4. Findings and Discussion

We can get the results from the 10 respondents' oral online teaching experience, which affects the learning input of online teaching in many ways. There are several influencing factors of engagement mainly from several aspects. For example, the management level, the teaching level, the student level.: through the above interviews teaching interaction, learning motivation, problem solving ability, and the active participation of students in learning all affect the learning input and teaching effectiveness.

4.1. Have you Ever Taken Online Courses (Teaching Online Courses)? If So, Give an Example of an Online Course Platform?

All 10 interviewees had online class learning or teaching experience, and generally used software such as learning or teaching through the Catechism platform, Tencent Conference, Rain Classroom.

4.2. Why do you Choose Online Courses?

All seven respondent have the online courses because of the requirements of their schools or teachers. In addition, another T1 teachers believe that the Internet offer some the convenience of time and geographical area, which can also have the playback function.

4.3. How Long does Your Online Course Last Will be Better?

All the 10 student teachers gave feedback that the online course lasts for 2 hours, and if the online course lasts for a long time. they are particularly unfocused; individual students also gave feedback that sometimes the online course lasts for too long, he is very irritable, and they are often attracted by pop-up advertisements, and they even unconsciously go to do things that have nothing to do with the online course.

4.4. How do You Feel About Choosing to Study Online?

The longer the online time, the weaker the students feel. And they are reluctant to answer teacher's questions.

4.5. What are the Advantages and Disadvantages of Online Teaching?

10 respondents believe that the biggest advantage of online teaching is that the online Teaching platform provides a look-back function, which is conducive to teachers or through the look-back function to review the whole process of their own teaching or learning, so that they can carry out self-reflection. The biggest disadvantage of online teaching is the lack of classroom interaction and students' learning status cannot be controlled in real time.

In addition, the most is to ask a few small questions in the course of the explanation to observe the general listening situation of students, but this kind of inspection is easily

distorted, and cannot be traversed every student.

4.6. What do you Think are the Factors that Affect Online Teaching?

We Summarized the feedback from 10 respondents, the factors that affect online teaching mainly include: equipment, platform factors, teachers' teaching methods, comprehensive quality and so on. In addition, it also involves the students themselves, motivation, curiosity, student engagement, and the teaching style of the instructor.

4.7. Or the Overall Evaluation of Teachers (Students), Are You Engaged in on Line Courses? What is the Engaged Problem?

All 10 respondents agreed that they are not fully engaged, the main reason for online learning is that the teacher can't see what the students are doing, it is easy to get distracted and lose concentration for there is little interaction during the whole process.

4.8. Do you have Strong Desire to Engage in Online Course?

All 10 respondents mentioned that their engagement in the online environment is not good, because the online environment can be watched over and over again because of the flexibility of the learning time, and they can search for information on the Internet anytime and anywhere without worrying about missing the content of the study, and sometimes they are not willing to take the initiative to study. Especially when the time of online class is long, it is very irritating.

4.9. Do you have the Problem-Solving Ability to Deal with Online Issues?

All 10 interviewees agreed that there are indeed online problems and lack of in-depth thinking. sometimes the teacher thinks that it is simple and passes over, the students do not understand. It is very hard for the students they can't continue to listen to the lesson. Sometimes teachers also encounter some technical problems which lead to a lot of time is wasted to figure out. The teacher-student interaction provided by the platform is not good enough to have a good online classroom atmosphere.

4.10. Do you Participate in the Interaction and Communication between Learners in Online Course Teaching?

Do you participate in the interaction and communication between learners in online course teaching?

There is not a lot of interaction with the teacher and students, especially in a large class of 60 students. the teacher will occasionally ask questions, but seldom interact with the students.

5. Conclusion and Strategies

Based on the above findings, it can be found that teacher-student interactions, student-student interactions, student-content interactions, student motivation, and problem-solving skills all affect student learning engagement. Based on the above findings, specific strategies to improve learning engagement in online teaching are proposed as follows:

Firstly, we can improve the quality of learning engagement and the sense of presence of teaching engagement. Online learning should have a general grasp of the curriculum attributes of the discipline, and in the design of training programme according to the curriculum attributes of different disciplines and course characteristics.

secondly, we can build social interaction and enrich the course form. In the future teaching, teachers should pay attention to the interaction with students, especially the online teaching interaction between teachers and student-student interaction. There are many ways to learn, such as the exchange of homework, task learning, course feedback, resource sharing, cooperative learning, etc. In order to mobilize the positive emotions of students' learning, we can effectively enhance the emotional engagement.

Thirdly, we can enhance students' learning motivation and stimulate students' interest in learning. (a) Teachers should make different classifications according to students' personality characteristics and growth environment. (b) The teacher encourage different types of students to be used for questioning, and allow students to participate in the teaching process, take the initiative to explore the problems and difficulties in learning, and enhance their initiative.

Fourthly, we can improve students' problem-solving ability. The students have desire to learn. Then, they have ability to learn from which interaction such as: teacher-student interaction, student-student interaction, student-content interaction. They can transform into each other.

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